



COLOR and MEANING
in the ART of
**ACHAEMENID
PERSIA**

ALEXANDER NAGEL

COLOR AND MEANING IN THE ART OF ACHAEMENID PERSIA

In this volume, Alexander Nagel investigates the use of polychromy in the art and architecture of ancient Iran. Focusing on Persepolis, he explores the topic within the context of the modern historiography of Achaemenid art and the scientific investigation of a range of works and monuments in Iran and in museums around the world. Nagel's study contextualizes scholarly efforts to retrieve aspects of ancient polychromies in Western Asia and interrogates current debates about the contemporary use of color in the architecture and sculpture in the ancient Mediterranean world, especially in North Africa and the eastern Mediterranean. Bringing a multidisciplinary perspective to the topic, Nagel also highlights the important role of theory, methodology, and conservation studies in the process of reconstructing polychromy in ancient monuments. A celebration of the work of painters, artisans, craftsmen and -women of Iran's past, his volume suggests frameworks through which historical and contemporary research play a dynamic role in the reconstruction of ancient technological knowledge.

Alexander Nagel is Assistant Professor and Chair of the Art History and Museum Professions Program at the State University of New York's Fashion Institute of Technology. He is a Research Associate at the Smithsonian Institution in Washington, DC, where he curated exhibitions on Iran, Iraq, Greece, Egypt, and Yemen.

COLOR AND MEANING IN THE ART OF ACHAEMENID PERSIA

ALEXANDER NAGEL

Smithsonian Institution and

Fashion Institute of Technology, State University of New York



CAMBRIDGE
UNIVERSITY PRESS



Shaftesbury Road, Cambridge CB2 8EA, United Kingdom

One Liberty Plaza, 20th Floor, New York, NY 10006, USA

477 Williamstown Road, Port Melbourne, VIC 3207, Australia

314–321, 3rd Floor, Plot 3, Splendor Forum, Jasola District Centre, New Delhi – 110025, India

103 Penang Road, #05–06/07, Visioncrest Commercial, Singapore 238467

Cambridge University Press is part of Cambridge University Press & Assessment, a department of the University of Cambridge.

We share the University's mission to contribute to society through the pursuit of education, learning and research at the highest international levels of excellence.

www.cambridge.org

Information on this title: www.cambridge.org/9781009361293

DOI: [10.1017/9781009361309](https://doi.org/10.1017/9781009361309)

© Cambridge University Press & Assessment 2023

This publication is in copyright. Subject to statutory exception and to the provisions of relevant collective licensing agreements, no reproduction of any part may take place without the written permission of Cambridge University Press & Assessment.

First published 2023

Printed in the United Kingdom by TJ Books Limited, Padstow Cornwall

A catalogue record for this publication is available from the British Library.

Library of Congress Cataloging-in-Publication Data

NAMES: Nagel, Alexander, 1971– author.

TITLE: Color and meaning in the art of Achaemenid Persia / Alexander Nagel, Smithsonian Institution, Washington DC.

DESCRIPTION: Cambridge : Cambridge University Press, 2023. | Includes bibliographical references and index.

IDENTIFIERS: LCCN 2022059502 | ISBN 9781009361293 (hardback) | ISBN 9781009361330 (paperback) | ISBN 9781009361309 (epub)

SUBJECTS: LCSH: Polychromy—Iran—History—To 1500. | Paint materials—Research. | Art, Achaemenid.

CLASSIFICATION: LCC NA3574.A1 N34 2023 | DDC 709.35/772—dc23/eng/20230105

LC record available at <https://lccn.loc.gov/2022059502>

ISBN 978–1–009–36129–3 Hardback

Cambridge University Press & Assessment has no responsibility for the persistence or accuracy of URLs for external or third-party internet websites referred to in this publication and does not guarantee that any content on such websites is, or will remain, accurate or appropriate.

CONTENTS

<i>List of Figures</i>	<i>page</i> ix
<i>Acknowledgments</i>	xv
INTRODUCTION: THE MOST BEAUTIFUL BLUES	I
Aim and Scope of This Book	5
Research on Ancient Pigments and Polychromy Today: A Bird's-Eye View	8
Veils and Filters: Polychromy Studies and Ancient Iran	14
Organization and Outline of This Book	16
I DEFINING POLYCHROMIES	21
Translations	22
Documenting, Extracting, and Presenting Polychromies from Ancient Western Asia	30
Approaching Ancient West Asian Polychromies: The First Decade (1843–1853)	32
Reinventing Ancient West Asian Polychromies: Sydenham (1854–1866)	37
... Meanwhile, Back in Paris: The French Approach	43
Debating Ancient Polychromies from Western Asia in the Twentieth Century	48
What Remains: Preserving the Paints of Ancient Palace Façades	54
2 HISTORIOGRAPHICAL OVERVIEW, PART I: APPROACHING ACHAEMENID PERSIAN POLYCHROMIES IN THE NINETEENTH CENTURY – ANCIENT LITERARY TESTIMONY AND MODERN DISCOURSES	59
Enter: Persepolis in Context	60

Ancient Literary Testimony for Polychromies at Persepolis and in the Achaemenid World	64
Seeing Colors and Gilding in the Early Years	65
Charles Texier, the Father of Modern Approaches to Persepolitan Polychromies	69
Achaemenid (and Elamite) Blues: Frédéric Houssay and Naqsh-e Rostam	72
“Beware, You Moderns of Degenerate Mind!” The Dieulafoys on the Polychromy of Achaemenid Susa	74
An Aesthetics of Repair: Susa at the World Exhibition in Paris in 1889	77
<i>White</i> Returns to Persepolis	84
The British Return: The Polychromies of the Hall of 100 Columns	85
3 HISTORIOGRAPHICAL OVERVIEW, PART II: APPROACHING ACHAEMENID PERSIAN POLYCHROMIES IN THE TWENTIETH CENTURY	89
Imaging and Imagining Achaemenid Persia in the Early Twentieth Century	90
“Was He Blonde?” Ernst Herzfeld and the Polychromies of Persepolis	94
A Case Study from the Hall of 100 Columns: The Figure in the Winged Disk	108
The Royal Throne: Further Observations on the Reliefs of the Hall of 100 Columns	116
Columns	116
Other Features of Architectural and Sculptural Polychromy in Persepolis	123
The Pigment Bowls from the Apadana	124
Disentangling Polychromies: Comparing Achaemenid Persian Glazed Brick Façades	127
The Original Polychromy of the Façade of the Tomb of Darius I at Naqsh-e Rostam	129
Preliminary Conclusions	138

4	UNCOMFORTABLE TRUTHS: CHALLENGES OF DOCUMENTING AND PRESERVING ACHAEMENID PERSIAN POLYCHROMIES	141
	Analytical Methods	142
	Information or Preservation?	143
	Conservators and Archaeologists	144
	Mold Making and Squeezes	147
	Cleaning, Restoration, Consolidation	156
	The Two Stone Bulls in the Portico of the Hall of 100 Columns	160
	Aspects of Preservation at Susa	168
5	A DISCUSSION: ASPECTS OF NONVERBAL COMMUNICATION IN THE ACHAEMENID PERSIAN EMPIRE	173
	The House of Paint: Empire-Wide Labor and Interconnected Craft Traditions	174
	On Find Contexts and Symbolic Meanings	178
	On Making Decisions in Persepolis	181
	On Pigment and Empire: Supplying the Courts with Material	183
	On Keeping Polychromy in Place	187
	On Polychromies in Empire: Color as a Signifier of Wealth	187
	On White on Blue – Gold on Blue: The “Beautiful Illusion”	188
	On Color, Materiality, and Surface in Persepolis	196
6	CONCLUDING CONTEMPLATIONS	201
	Surface Matters and the Search for <i>Authenticity</i> : Too Many Tasks, Too Few, or Too Many Pigments?	203
	Archaeologies of Paint at Persepolis and Beyond: In Memory of the Kings	208
	Pigments, Archives, and Modern Politics	213
	Making Achaemenid History: In Closing	217
	<i>Bibliography</i>	221
	<i>Index</i>	279

FIGURES

I.1	Close-up of 2,500-year-old blue pigments, remaining on a paper squeeze from the tomb of Darius at Naqsh-e Rostam, housed today in the Smithsonian Institution, National Museum of Asian Art, Department of Conservation and Scientific Research, 2009	page xx
I.2	View of the archaeological site and ruins of the terrace of Persepolis in Iran from the north. A roof covers the sculpted façades on the east front of the structure referred to as the Apadana, the largest building on the site	2
I.3	Royal necropolis at Naqsh-e Rostam with the tombs of four Achaemenid rulers carved in the mountain façades. The once brightly painted façade of the tomb of Darius I (†486 BCE) can be seen on the right. This is the tomb façade from which twentieth-century paper squeezes that contain blue pigments were made	3
I.4	The German archaeologist Ernst Herzfeld (1879–1948) worked on the site of Persepolis, first occasionally between 1923 and 1930 supported by German and Parsi industrials and then with an official sponsorship from the Oriental Institute in Chicago between 1931 and 1934. Herzfeld, who taught in Berlin and Princeton, frequently documented polychromies at Persepolis. Here, Herzfeld is standing near stone slabs on the eastern portico of the building referred to as the Apadana	4
I.5	Plan of excavated structures on the terrace complex of Persepolis, featured in this book. The large structure referred to as the Apadana holds a prominent place on the western side of the artificial terrace complex	5
I.6	Blue skies over mountain landscape south of the Caspian Sea in northern Iran in 2018. Herzfeld often described the landscapes in the most vivid terms and was deeply impressed by the light he encountered in western Asia	6
I.7	Map of modern Iran and Iraq with Persepolis, Susa, and Babylon. These ancient settlements were at the heart of a dense network of cities connecting people and goods in the Achaemenid Persian Empire	7

1.1	Painted sculptures from the Façade of the Nineveh Court, Sydenham, London, 1859 (Philip Henry Delamotte Collection). Note the bull-headed column capitals on the upper floor, inspired by recent excavations at Susa	20
1.2	Interior of an Assyrian palace (after Layard 1849, vol. 1: plate 2). The place of “plate 2” in art history has recently been restudied by Ada Cohen and Steven Kangas	35
1.3	Façade of the Nineveh Court, Sydenham, London, c. 1859. Album, British Library. Note how the paint of the columns and column capitals here differs from the photographs depicting the same structure	38
1.4	Nineveh Court, Crystal Palace, Sydenham, London, detail. Nineveh “Assyrian” court from gallery between 1855 and 1890. Musée d’Orsay, Réunion des Musées Nationaux et du Grand Palais, Paris	39
1.5	Hero holding a lion, from Dur Sharrukin, modern Khorsabad, Iraq, 721–705 BCE, alabaster, today in the Louvre, Paris, detail. Excavated by young Arab men under the direction of western “diplomats” in the mid-nineteenth century, the colossal stones were then transported and shipped to west Europe. Pauline Albenda, Astrid Nunn, Ariane Thomas and other scholars have summarized what we know about the polychromies of these early Mesopotamian stone sculptures	44
1.6	Painted detail from a relief from Dur Sharrukin, modern Khorsabad, Iraq, 721–705 BCE, alabaster, today in the Louvre, Paris	45
1.7	Painted plaster cast of an Assyrian stone slab (883–859), nineteenth century, Vorderasiatisches Museum, Berlin, VAG 19, artist unknown. The original slab from the ancient site of Nimrud in Mesopotamia is also housed in Berlin	47
1.8	Installation of an imaginary throne of a Persian king in Washington, DC’s Hall of the Ancients, c. 1900. This Xerxes near the White House is a rare example of an exciting creative engagement with the then excavated ruins at Persepolis or Takht-e Jamshid	48
2.1	Charles Texier’s chromolithographic reconstruction of a door jamb relief from Persepolis, published in Paris in 1852, ten years after he visited the site	58
2.2	Fragile miner’s woolen belt (“Saltman 3”) with blue, yellow, red, and brown warps, excavated at Douzklakh, Iran, detail. Original textile remains like these help us significantly to understand better the polychrome environments of those depicted at Achaemenid Persian monuments during the same time	66
2.3	Door jamb, Palace of Darius, Persepolis, with holes for inlays made from precious materials	72
2.4	Lottin de Laval’s reconstruction of the original polychromy of a relief from the north façade of the Apadana in Persepolis (1845–50), Musée du Louvre, Paris, RS 623	73

2.5	Original relief on the north façade of the Apadana at Persepolis, 2008	73
2.6	Portrait of Jane Dieulafoy (1851–1916), Musée Carnavalet, Paris	75
2.7	Idealized commercial illustration with workers and Jane and Marcel Dieulafoy at Susa, Khuzestan, late nineteenth century	76
2.8	Reconstructed glazed brick relief panel from a larger frieze depicting rows of guards from the Palace of Darius at Susa in the Louvre, detail	78
2.9	Painted frieze of guards from the Palace of Darius at Susa in the Louvre created for the South Kensington Museum in London, c. 1890, on display in the “Epic Iran” exhibition, Victoria and Albert Museum, London, May 25, 2021. Correspondence between the curators in London and in the Louvre provides insight into what world museologists thought about color in Susa in the late nineteenth century	80
2.10	Entirely modern reconstruction of a frieze of guards from the façade of Palace of Darius at Susa, in the Vorderasiatisches Museum, Berlin	81
2.11	Reconstructed brick panel with a striding lion. Babylon, 604–562 BCE, processional way, Vorderasiatisches Museum, Berlin	82
2.12	Reconstruction of the façade of the Palace of Darius at Persepolis	85
2.13	Reconstruction of the corner of the Apadana at Persepolis	86
2.14	Detail of red floor in the Palace of Darius, Persepolis, 2007	87
3.1	Façade of the tomb of Darius I (†486 BCE) at Naqsh-e Rostam	88
3.2	Ernst Herzfeld’s team making squeezes of inscriptions on the southern façade of the Takht, December 1923. Herzfeld seldom referred to those actually performing the work. In a diary, he refers to his workmen here as Djawād and Djuml	94
3.3	Herzfeld and his team sometimes included information on the traces of paint they noticed on the fragments excavated at Persepolis in the field books. The two fragments listed under No. 52 and No. 53, discovered on March 24, 1932, have red (“rot”) and blue (“blau”) still visible. For fragment No. 56 (March 26, 1932), drawn at the bottom, the handwriting describes the “eyeball red, eyelid painted in blue” (“Augapfel rot, Augenlid blau aufgemalt”). Institute for the Study of Ancient Cultures, University of Chicago (trans. mine).	95
3.4	The uppermost entry on this page from the same catalog includes information about the polychromy visible on object No. 29, excavated March 19, 1932, by the small staircase in the back of the Tripylon: “traces of paint: eye sockets wine red, lid: blue (?), gums and palate wine red” (“Farbreste: Augenwinkel weinrot, Lid: blau (?), Zahnfleisch und Gaumen weinrot”). Institute for the Study of Ancient Cultures, University of Chicago (trans. mine).	96
3.5	Excavations on the eastern façade of the Apadana at Persepolis, Fall 1932	97
3.6	Southern side of the Hall of 100 Columns: western doorway eastern jamb	100

3.7	Southern side of the Hall of 100 Columns: western doorway eastern jamb, north. Throne. Traces of blue paint, detail	101
3.8	Southern side of the Hall of 100 Columns: western doorway eastern jamb, north. Throne. Traces of red paint	102
3.9	Fragment of a glazed brick, excavated by Ernst Herzfeld at Persepolis, Freer Study Collection, National Museum of Asian Art, Washington DC, FSC A 3d	103
3.10	Bowl with paint residues, excavated by Herzfeld in the so-called Harem. Institute for the Study of Ancient Cultures Museum Chicago, Inv. No. A 19384	104
3.11	Tripylon, north, eastern door jamb, detail	106
3.12	Tripylon, north, eastern door jamb, detail	107
3.13	Figure in winged disk, Hall of 100 Columns, south, western doorway, eastern door jamb in situ, 2007	109
3.14	Figure in winged disk, Hall of 100 Columns, south, eastern doorway, eastern door jamb in situ, 2007	110
3.15	Figure in winged disk, originally from Hall of 100 Columns, south, eastern doorway, western door jamb. Fogg Museum of Art, Harvard University Art Museums, Cambridge, 1943.1062	111
3.16	Watercolor of figure in winged disk, prepared by Ernst Herzfeld (?)	112
3.17	Fragment of a lion's face, National Museum, Tehran, Inv. No. 1202	114
3.18	Workman at Persepolis with blue pellet after excavation, 1975	117
3.19	Sherds, encrusted with pigments, excavated at the Shaur Palace in Susa	121
3.20	Sherd, encrusted with Egyptian blue pigments, excavated at Qal-e Kali	121
3.21	Micrographic photo from the surface of a fragment of an ear of animal protome, excavated on the Takht. Persepolis Museum, Inv. No. 303	122
3.22	Pellets of blue excavated on the Takht. Persepolis Museum, storeroom	126
3.23	Egyptian blue paints in the Old Persian inscription. Façade of the Tomb of Darius I at Naqsh-e Rostam	130
3.24	Detail of Egyptian blue paint residues on squeeze taken from Old Persian inscription on the façade. Herzfeld Archives, National Museum of Asian Art, Washington, DC	130
3.25	Identified paints on the figure of Darius. Façade of the Tomb of Darius I at Naqsh-e Rostam	131
3.26	Façade of the Tomb of Artaxerxes II, 2007. Traces of blue paint are visible on the hair and beard of the guard	134
3.27	Façade of the Tomb of Artaxerxes II, 2007. Bull capital	135
3.28	Façade of the Tomb of Artaxerxes II, 2007. Bull capital, traces of red paint layer	135

3.29	Fragment of a capital in form of a protome in form of a bull: the right eye. From the capital of the audience hall (Apadana) of the Palace of Darius I (522–486 BCE). Limestone, 48 × 41 cm AOD3	136
3.30	Detail of cavetto. Façade of the Tomb of Artaxerxes II, 2008	137
3.31	Detail of cavetto. Façade of the Tomb of Artaxerxes II, 2008	138
3.32	Detail of cavetto. Façade of the Tomb of Artaxerxes II, 2008	139
4.1–4.2	Two photographs of Persian workmen cleaning the surface of stone reliefs on the eastern façade of the building referred to as the Apadana at Persepolis, 1932 or 1933. Institute for the Study of Ancient Cultures Museum Chicago	140
4.3	Paper squeeze from the Frataraka Complex at Persepolis, Akademie der Wissenschaften, Berlin, under the microscope, June 2022	153
4.4	Microscopic image of ultramarine blue pigments from a paper squeeze (Figure 4.3)	154
4.5	Roof above eastern façade of Apadana, constructed in 1952	157
4.6	Protective roof, constructed in the 1990's, above the eastern façade of the Apadana or Audience Hall, 2009	158
4.7	Donato Bastiani (1869–1953), a sculptor-restorer who worked on the fragments from Persepolis after they arrived at the University of Chicago	162
4.8	Bastiani working on the restoration of a bull monument from Persepolis in the Museum of the Institute for the Study of Ancient Cultures Museum in Chicago	163
4.9	Portico, western <i>anta</i> , Hall of 100 Columns	164
4.10	Reconstructed head of bull, portico, western <i>anta</i> , Hall of 100 Columns, 2016	165
4.11	Head of bull, portico, western <i>anta</i> , Hall of 100 Columns, in situ, detail, 2008	165
4.12	Head of bull, portico, western <i>anta</i> , Hall of 100 Columns, in situ, detail, 2008	166
4.13	Head of bull, portico, western <i>anta</i> , Hall of 100 Columns, in situ, detail, 2008	167
4.14	Head of bull, portico, western <i>anta</i> , Hall of 100 Columns, in situ, detail, 2008	168
4.15	Head of bull, portico, western <i>anta</i> , Hall of 100 Columns, in situ, detail, 2008	169
4.16	Nostril of head of bull, portico, western <i>anta</i> , Hall of 100 Columns, in situ, 2008	170
5.1	Raw lapis lazuli was excavated at many sites throughout Iran. There are great quantities of raw lapis, especially at Shahr-e Sokhta in Eastern Iran and in Susa in Khuzestan. The fragments depicted here were excavated under Jacques de Morgan (1857–1924) at Susa. Musée du Louvre, Paris. Oriental Antiquities, SB23957	172

5.2	Azurite on display at the Natural History Museum, Isfahan, Iran, 2016	186
5.3	Fragment of doorknob or wall peg with trilingual inscriptions (DPi), excavated near the so-called Harem. Tehran Museum, Inv. No. 2405	190
5.4	Fragment of doorknob or wall peg with trilingual inscriptions (DPi), excavated near the so-called Harem. Tehran Museum, Inv. No. 2408	191
5.5	Egyptian blue lion paw, inlaid claws missing, excavated at Persepolis. Institute for the Study of Ancient Cultures Museum Chicago, A23054	192
5.6	Lion's paw with traces of blue paint, excavated at Persepolis. Institute for the Study of Ancient Cultures Museum Chicago, Inv. No. 24117	193
5.7	Head of blue material, excavated at Persepolis. Tehran National Museum, Inv. No. 1294	193
5.8	Beard fragment of blue material, acquired by the American Edward Newell (1886–1941) from an unknown dealer, Achaemenid period. Yale Peabody Museum BC 038145	194
6.1	Modern painted column prepared for an exhibit on Persepolis in Speyer, Germany, inspired by traces of paint on original architectural stones on the site of Persepolis, 2006	200
6.2	Modern painted columns and column capital prepared for an exhibit on Persepolis in Speyer, Germany, 2006	205
6.3	Digital reconstruction of the northern facade of the building referred to as the Apadana or audience hall at Persepolis by the artist Simon Saeidi, 2017	206
6.4	Feasting like an Achaemenid Persian king in a modern restaurant, Rio de Janeiro Municipal Theatre, Brazil	206
6.5	Taq-i Nusrat (Triumph Arch). Ceremonial gate with polychrome sculptures for the crowning of Reza Shah celebrations in Tehran, 1925	210
6.6	Ceremonial gate with polychrome interpretations of Achaemenid Persian guards, Tehran	212
6.7	Ceremonial gate with polychrome interpretations of Achaemenid Persian guards, Isfahan	213
6.8	Painted Qajar relief at Taq-e Bustan, 1905	214
6.9	Paint palette, Isfahan bazar, 2016	218
6.10	Modern decorative street art sculpture in Shiraz, 2016	219

ACKNOWLEDGMENTS

I owe many colleagues and friends a great many thanks for their support, trust, and friendship over these last years. Your “yes” and your inspiration and the great spirits you uplifted meant the world to me. Thank you for believing in my ideas. Space permits me to mention only a few of those who have helped. The book could not have been written, and my work on the project could never have happened, without the dedicated contribution of many friends and colleagues in Iran, the United States, and Europe. This book is, if nothing else, all about culture-crossing, language and otherwise. Multicultural dialogue has been imperative from the very beginning. I owe so much gratitude to Mohammad Talebian, Hamid Fadaei, Ali Asadi, Mehrnaz Bordbar, Maryam Rahsaz, Hassan Rahsaz, Omid Oudbashi, Atefeh Shekofte, Soheil Delshad, Alireza Asgari Chaverdi, Javad Jafari, Koroush Mohammadkhani, Afshin Yazdani, Saeid Rahmati, and everyone else in Persepolis and in Iran without whose support nothing would be.

I do not even know how to begin acknowledging Margaret Cool Root. Ever since we met in 2004, I found in Margaret a remarkable and inspiring mentor who became a dear friend. With calm, erudition, and essential knowledge, Margaret led me and others safely in reading monuments, art history, and humanity between the ancient Zagros and the institutions of higher learning we are in today. I am grateful to Margaret, whose seminars in the Kelsey Museum of Archaeology started it all. I am also grateful to Carl Nylander and his wife, Eva, who provided a wonderful week in Sweden and invited me to present some aspects of this research in a seminar at Lund University, in the spirit of Ann Britt Tilia. It was an honor to meet one of Margaret’s mentors. Then, early in 2006, after I had spent many days studying the archives of Ernst Herzfeld and Erich Schmidt at the University of Chicago thanks to an invitation by then director Gil Stein, I reached out to colleagues at the International Association of Mediterranean and Oriental Studies (ISMEO) in Rome to consult with the archives of Ann Britt and Giuseppe Tilia. Thank you to Pierfrancesco Callieri and Adriano Rossi who introduced me to Alessandro and Stefano Tilia and Angela Bizzarro, at whose home near Rome I was fortunate to spend some precious times. Thank you to Gian Pietro Basello. At the same time, I am forever grateful to Judith Lerner, who

was so very instrumental in starting modern research on the polychromies of Persepolis many years before me. Thank you, Judith, for spending so many hours with me, sharing your archives, and letting me use a photograph from them.

Kamyar Abdi, you continue to be a guiding light. You helped reach out to so many colleagues and introduced me to Mohammad Talebian, who was so very generous and kind to meet in Tehran. Mohammad Talebian provided permission to research and stay in Persepolis for extended periods. In Tehran, I would like to acknowledge many colleagues who worked or work in the National Archaeological Museum, a wonderful repository of many materials from Persepolis and home to excellent caregivers and scholars. Firouzeh Sepidnameh, Jebrael Nokandeh, and Fereidoun Biglari; the former general directors of the National Museum of Iran Mahnaz Gorji, Mohammad Karger, and Mohammad Reza Mehrandish; and Anita Hemmati Pure all educated me and helped me so very much. Thank you, Shahrokh Razmjou, for becoming a dear colleague and friend. Judith Thomalsky, Margrit Hakimpour, and Barbara Helwing of the German Archaeological Institute helped me by providing a home. Thank you to Abolfazl Aali, Natascha Bagherpour-Kashani, Karina Groemer, Fabian Schapals, and Thomas Stöllner for their kind permission to publish a photograph of the garment fragment excavated at Douzlakh, which enables us, due to a tragic accident that happened around 400 BCE, to come closer to the actual life of the craftsmen and people in the Achaemenid Persian Empire.

I owe my deepest gratitude to the directors and representatives of the staff of archaeologists working on the preservation of the major Achaemenid capital in modern Shush, ancient Susa, especially Mohammad Reza Chitsas, former director of Shush Archaeological Complex, Reza Chanany, general manager, Bijan Heydari and Kazem Borhanianhang from the Conservation Team, and Mosa Zare, Lida Sayahi, and Sara Esmaeili for arranging contacts, driving, and providing access to study some of the material discussed here. I would like to thank Fatima Mohseni for sharing information on her important work on the wall paintings from the Shaour Palace.

I have been extraordinarily lucky and fortunate to become part of several communities. I would like to thank my colleagues at the Smithsonian Institution in Washington, DC where I found a home at the National Museum of Natural History. I am especially grateful to Laurie Burgess, Mary Jo Arnoldi, Melinda Zeder, Torrey Rick, Paul Taylor, Igor Krupnik, Sabrina Sholts, Rick Potts, Bill Fitzhugh, Joshua Bell, Candace Greene, Dave Rosenthal, Eric Hollinger, Jim Krakker, Gary Krupnik, and many other colleagues. I would like to thank Massumeh Farhad, who welcomed me to a different part of the Smithsonian Institution, to Janet Douglas, Blythe McCarthy, Donna Strahan, Kathryn Phillips, Reiko Yoshimura, David

Hogge, Rachael Woody, and many friends I made at the National Museum of Asian Art. In Washington, DC. I also thank Babette Margolies, Marianne Lubkin, and all new friends at the wonderful Dumbarton Oaks Research Library and Collection.

My early interests in aspects of the examination and preservation of polychromies and the limestone monuments led me deeper to research in aspects of the modern preservation of limestone sculpture on the site, histories, and theories of conservation. Since 2018, I have also been fortunate to work at the State University of New York's Fashion Institute of Technology in New York City. Here, I thank David Drogin, Anna Blume, Justine De Young, Patrick Knisley, Nanja Andriananjanason, Molly Schoen, Kasra Sardashti, Katherine Michaelsen, Rachel Baum, Lourdes Font, Paul Melton, Praveen Chaudry, Beth Clancy, Andrew Weinstein, Jennifer Babcock, Amy Werbel, Kyunghye Pyun, Natasha Degen, Deborah Berhanu, Karen Pearson, Helen Gaudette, Amy Lemmon, Jennifer Fantozzi, Mary Tsujimoto, and Andrea Vázquez de Arthur. Anna Blume in particular helped me with references to ongoing research on polychromy and painting in Mesoamerican art.

I am also grateful to the many students I had over the years in Washington, DC and New York City as I learned from conversations and discussion with everyone. In New York City, thank you to my dear friend Zainab Bahrani at Columbia University who read and commented on earlier versions. I thank Sidney Babcock and Nicole Leist from the Morgan Library and Museum; Erhan Tamur, Kim Bentzel, Yelena Rakic, Sarah Graff, Michael Seymour, and Daira Eden Robert from the Metropolitan Museum of Art; Dan Potts, Fiona Kidd, and Judith Lerner at New York University; Amy Gansell from St. John's University; and Roger Carmona from Kremer Pigments. At Yale University's Babylonian Collection housed in the Peabody Museum of Natural History, I thank Agnete Lassen and Klaus Wagensöner. During two sponsored trips to Greece, Antigoni Zournatzi and Marian Feldman provided a stimulating intellectual environment to engage with craft exchanges in the ancient world. I was fortunate to engage with scholars such as Michael Roaf, Ann Brysbaert, and Nassos Papalexandros, Stella Katsarou, and many others who became dear friends over time. I thank fellow polychromy researchers Astrid Nunn, Brigitte Bourgeois, Omid Oudbashi, Atefeh Shekofte, Shiyanthi Thavapalan, Jan Stubbe-Ostergaard, Susanne Ebbinghaus, and Clarissa Blume-Jung, and I thank Jennifer Stager. Philippe Jockey was so very generous and kind to look at an early draft. Thank you!

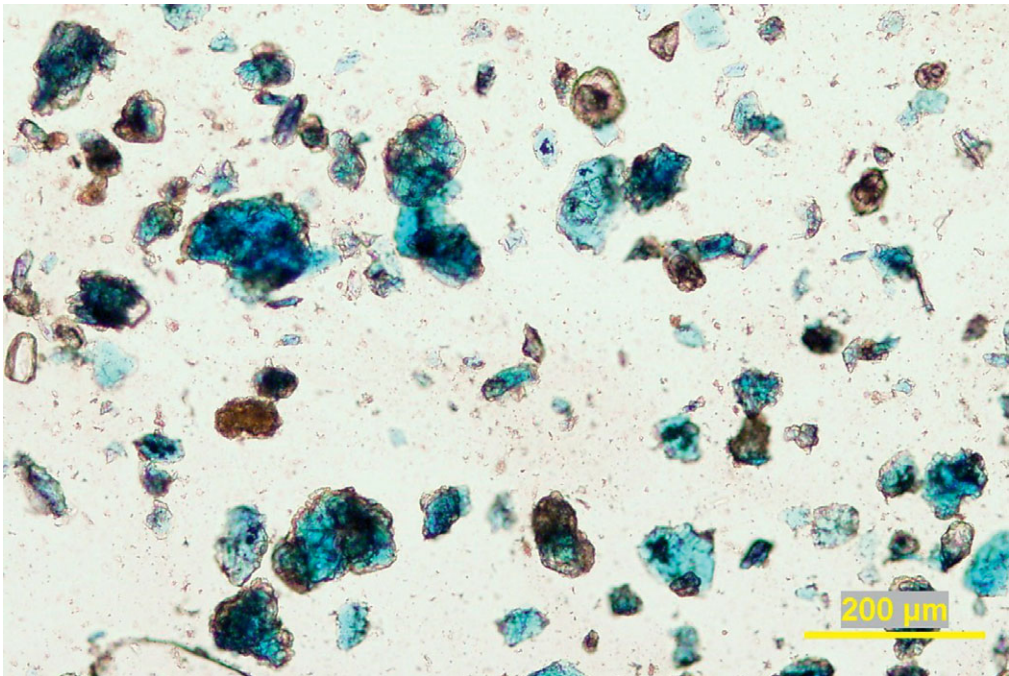
For so many reasons, I remain indebted to Stefan Simon, Cristina Aibéo, Marisa Pamplona, and Regina Pausewein from the Rathgen Research Laboratory in Berlin. To Stefan I owe particular thanks since he introduced me to the wonderful Abdolrasool Vatandoust. In Berlin, I am also grateful to Barbara Helwing, Nadia Cholidis, Ralf B. Wartke, May Sarah Zessin, Melanie

Krebs, Jens Kroege, and Klaus Hallof. I would like to thank Heiko Krefter, who invited me to learn more about his father's archives during a wonderful visit in 2011. An invitation by the Latrobe Society in Washington, DC came at the right time to encourage me to think more about *Papertrails and Polychromies at Persepolis. Working on the Monuments of Darius the Great* in 2016. Parts of this unpublished talk can be found within this book.

There is significance in the fact that monumental architectural sculptures from the site have been removed to museums in London, Chicago, and elsewhere. Following the impressive archives Ann Britt Tilia collected, I shared more information as I went to see the limestone fragments from monuments on the site in faraway places such as Minneapolis and elsewhere with my colleagues in Persepolis. I am grateful to Lindsay Allen in London, with whom I had early exchanges, but more so to many archivists and institutions, most important Oscar Nalesini of ISMEO in Rome and John Larson and Anne Flannery at the Institute for the Study of Ancient Cultures in Chicago. In Chicago, I thank Matthew Stolper, Helen McDonald, Susan Allison, Laura D'Alessandro, Alison Whyte, Kiersten Neumann, and Jack Green. At the Harvard Art Museums, I owe a great many thanks to Susanne Ebbinghaus, Kathy Eremin, and Alison Cariens. In Paris, I thank Julien Cuny, Virginie Fabre, and Ariane Thomas. Rémy Boucharlat and Pierre Briant helped at various stages. I thank Julian Decyk for allowing me to use his photographs and Simon Saeidi for kind permission to use his beautiful digital recreation of building façades on the platform at Persepolis.

Travel grants and financial support from the University of Michigan included a grant from the International Institute, a Horace H. Rackham School of Graduate Studies Predoctoral Fellowship, a Freer Fund of the Department of History of Art, and two summer travel grants from the Interdepartmental Program in Classical Art and Archaeology. I also received financial support from the American Philosophical Society, the Graham Foundation in Chicago, and the German Archaeological Institute that enabled me to study in Iran and to do extensive work at Persepolis, Susa, in Tehran, Rome, Chicago, Berlin, Cambridge, and elsewhere.

So many kind and wonderful colleagues and individuals have contributed to this work, directly and indirectly. My editor, Beatrice Rehl, enthusiastically welcomed the idea and supported the manuscript throughout its process with such professionalism. I also thank two more anonymous reviewers who provided very useful feedback and advice. Finally, this is for all my amazing friends and close family: Travis, Thomas, Anja, Gisi, Andreas, Peter, Inge, and Guenter, Ali, Kouroush, Mehrnaz, Soheil, Maryam and her family, who all have been with me throughout all or most of the journey. You are the best!



1.1. Close-up of 2,500-year-old blue pigments, remaining on a paper squeeze from the tomb of Darius at Naqsh-e Rostam, housed today in the Smithsonian Institution, National Museum of Asian Art, Department of Conservation and Scientific Research, 2009. Photo: Janet Douglas

INTRODUCTION: THE MOST BEAUTIFUL BLUES

Behind glass doors in a repository in the basement of the National Museum of Asian Art at the Smithsonian Institution in Washington, DC, remain a modest number of beautiful pigments from almost 2,500-year-old stone façades on the sites of Persepolis, Naqsh-e Rostam, and Pasargadae in Iran (**Figures I.1–I.3**). Away from the ruins of the monuments standing calm and in gentle dignity in Fars in southern Iran, these tiny pigments, stuck on paper squeezes made on the sites only two generations ago provide an amazing opportunity to approach and better understand the aesthetics and sensual visual culture of the great palaces and environs of Achaemenid Persia. Even more, the residues are a window into the world of the craftsmen and people who built Persepolis and other sites. They are part of the great narrative connecting painters, people, places, and traditions across cultures and times, connecting the largest world empire between the late sixth and mid fourth centuries BCE and beyond with today. They are at the heart of this book.

The residues also help us to engage with and think about the aesthetic experience once encountered by those who visited these sites. They encouraged others and me to travel with those who documented and managed to transport them away from the façades, to witness the first modern engagements with this colorful past, and to comprehend a modern western fascination with the impressive ruins on these sites. One such modern individual was the German archaeologist Ernst Herzfeld (1879–1948), whose interventions on the site of Persepolis and whose aspirations to uncover the histories of the site



1.2. View of the archaeological site and ruins of the terrace of Persepolis in Iran from the north. A roof covers the sculpted façades on the east front of the structure referred to as the Apadana, the largest building on the site. Courtesy B. N. Chagny, Iran–France Mission at Persepolis–Pasargadae

have inspired many later researchers while leaving a complex legacy on the site (**Figures I.4 and I.5**). A note in a letter Herzfeld had written from his camp in Persepolis to James Henry Breasted, director of the Oriental Institute in Chicago on November 5, 1932, is perhaps a good start to introduce how these aspects of polychromies of the originally painted façades surprised him:

I nearly forgot to mention that yesterday, during the uncovering of a door in the Tripylon the lower part of a relief was found, ... in its original bright colors. ... I first thought that the reliefs essentially were the colors of the polished stone, i.e. black and only a few parts, like ornaments, feather wings, lips, eyes, overlaid with red and bright blue, green, and yellow. Now, it seems rather that all reliefs were entirely painted in brilliant, alternating colors, perhaps on the polished, black ground. What a strange impression this must have been!¹

¹ “Ich hätte fast vergessen, dass gestern bei der Freilegung einer Tür im Tripylon der untere Teil eines Reliefs, ... in seiner vollen ursprünglichen Farbenpracht zu Tage kam. ... Nach den Farbresten, die sich überall an den in der Erde begraben Skulpturen finden, hatte ich geglaubt, dass die Reliefs wesentlich die natürliche Farbe des polierten Steines, d.h. schwarz, gezeigt hätten und nur einige Teile, wie Schmuck, Flügel, Lippen, Augen mit rot und hellblau, grün und gelb aufgehöhnt gewesen wären. Nun sieht es doch mehr aus, als seien die



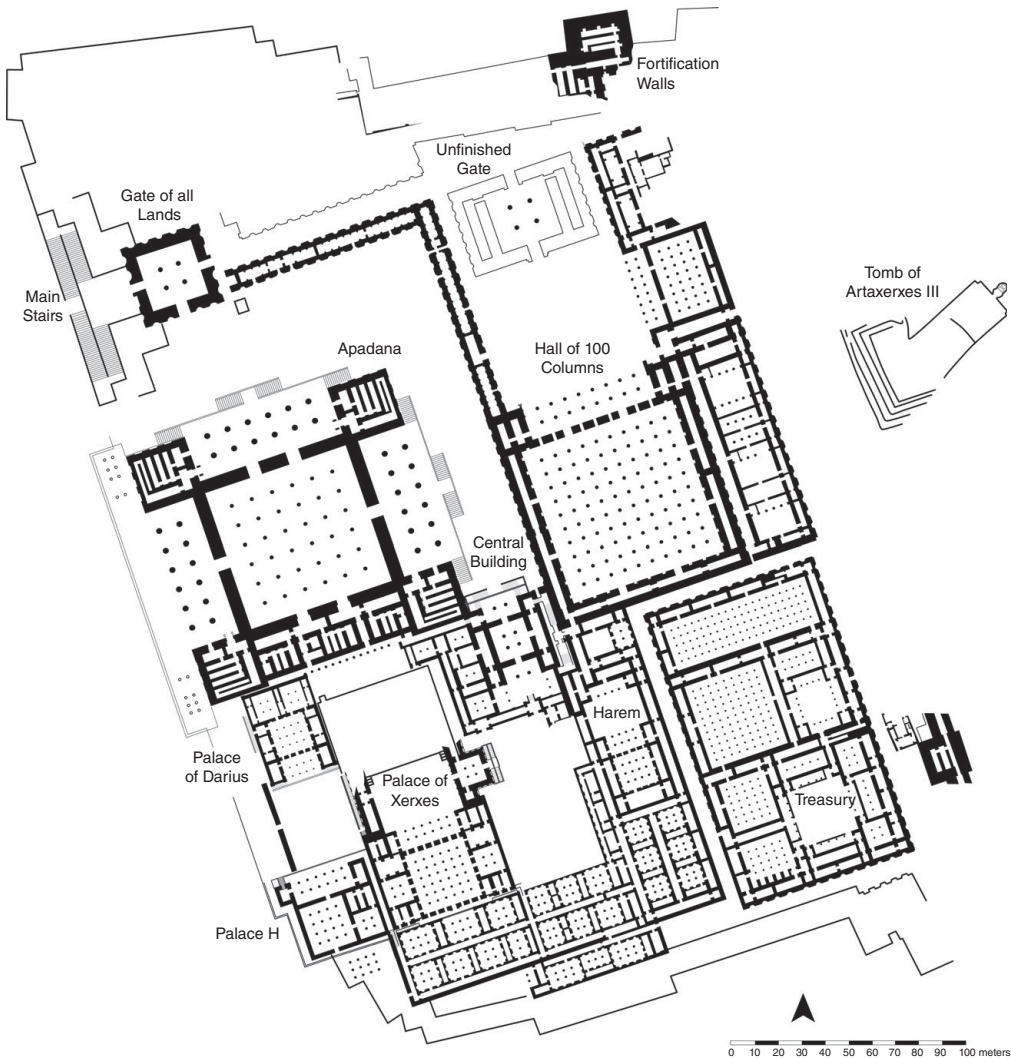
1.3. Royal necropolis at Naqsh-e Rostam with the tombs of four Achaemenid rulers carved in the mountain façades. The once brightly painted façade of the tomb of Darius I (†486 BCE) can be seen on the right. This is the tomb façade from which twentieth-century paper squeezes that contain blue pigments were made. Photo: Juergen Hasenkopf, Alamy Stock Photo

Herzfeld had documented precious traces of polychromies on stone monuments at Persepolis and Pasargadae during earlier visits in 1923 and 1928 as well as wall paintings at other sites further east of the Zagros, such as those on the walls of the palaces at Kuh-e Kwaja, today close to the border of Afghanistan. Some more of Herzfeld's important observations, many unpublished until this day, will be introduced throughout the following pages. I got to know the scholar, the person, and the aspirations of Herzfeld better through reading his letters and diaries, through the photographs he took and the drawings he made, which are kept in Washington, DC, Chicago, New York, Berlin, and elsewhere. Herzfeld often described the beautiful skies and colors of the landscapes he visited in the Zagros and in western Asia (**Figure I.6**). Herzfeld's story is now entangled in the history of research on pigments at Persepolis.

Reliefs so gut wie vollständig bemalt gewesen, in leuchtenden, gegensätzlichen Farben, vielleicht vor dem polierten, schwarzen Grund. Was für ein seltsamer Eindruck muss das gewesen sein!" (trans. mine). Herzfeld, letter to James H. Breasted, November 5, 1932, Institute for the Study of Ancient Cultures, University of Chicago, Archives.



1.4. The German archaeologist Ernst Herzfeld (1879–1948) worked on the site of Persepolis, first occasionally between 1923 and 1930 supported by German and Parsi industrials and then with an official sponsorship from the Oriental Institute in Chicago between 1931 and 1934. Herzfeld, who taught in Berlin and Princeton, frequently documented polychromies at Persepolis. Here, Herzfeld is standing near stone slabs on the eastern portico of the building referred to as the Apadana. Photo. Courtesy of the Institute for the Study of Ancient Cultures, University of Chicago



1.5. Plan of excavated structures on the terrace complex of Persepolis, featured in this book. The large structure referred to as the Apadana holds a prominent place on the western side of the artificial terrace complex. Drawing. Courtesy of the Institute for the Study of Ancient Cultures, University of Chicago

AIM AND SCOPE OF THIS BOOK

This book describes an ongoing fascination with the paints and polychromies creating modern ideas of the monumental art of the Achaemenid Persian Empire – and, by extension, of the broader context of the ancient cultures around the Zagros mountains between about 520 and 330 BCE (**Figure I.7**). It is a cultural history. The objective is to increase and offer pragmatic knowledge and provide insights into the understandings of and ongoing collaborative research on aspects of polychromies and paint. Can this modern research on crafting surface decorations help us ultimately in a better understanding of the



1.6. Blue skies over mountain landscape south of the Caspian Sea in northern Iran in 2018. Herzfeld often described the landscapes in the most vivid terms and was deeply impressed by the light he encountered in western Asia. Photo: uskarp, Alamy Stock Photo

material culture of the ancient sensual landscape? It can if we remain critical and are aware of several caveats. This book is an invitation to think about the power and the role of polychromies in the Achaemenid world.

The three main goals of the book are (1) to help the reader to understand the opportunities and limits we are faced with when constructing ancient Achaemenid Persian polychromies altogether today; (2) to introduce and contextualize modern efforts in retrieving aspects of ancient polychromies; and (3) to suggest frameworks in which future research can play a crucial and dynamic role in investigating aspects of ancient technological knowledge. Ultimately, my goal is to celebrate the painters, artisans, and craftsmen of the past who decorated the palatial environs.

Systematic documentation of remnants of polychromies on the exterior and interior relief sculptures and monuments at and from Persepolis and other sites of Achaemenid presence such as Naqsh-e Rostam, Pasargadae, and Susa is ongoing. Together with investigations of hitherto unpublished archival materials to collect citations of evidence no longer preserved for scrutiny, this book offers a platform for wide-ranging analyses and discussion. We can gain valuable information on the concepts and contexts of ancient craft production and aesthetics as well as the natural resources work crews exploited in their projects for the imperial agenda. With rigor and strategic thinking, we might



1.7. Map of modern Iran and Iraq with Persepolis, Susa, and Babylon. These ancient settlements were at the heart of a dense network of cities connecting people and goods in the Achaemenid Persian Empire. Drawing by Reid Hoffman

even consider imagining the ancient *chaîne opératoire* and principles informing and guiding technologies of paint application operatives, as well as the maintenance of surface decoration on ancient architectural sculpture, and critically scrutinize modern aesthetics and archaeological and museological practices of care and conservation.

Persepolis, Naqsh-e Rostam, Pasargadae, and Susa are only four major sites in the vast Achaemenid Persian Empire, which reached from the Indus to the Danube and across North Africa. In recent years, many more sites have been explored. As we know from the thousands of inscriptions preserved on tablets excavated at Persepolis, many of which have been deciphered in recent decades, craftsmen and -women were brought from all over to serve the court's vision of grandeur and display. Thus, knowledge based on texts, combined with archaeological evidence of the original polychromies of Achaemenid Persian imperial monuments, can inform the study of patrons and craftsmen in the mid-first millennium BCE writ large. All these tasks, and the observations ensuing from them, enable us ultimately, in turn, to gain a deeper understanding of the sensory landscapes inhabited by past Persian court elites and experiences by those who visited these impressive Persian heartland capitals from far and wide.²

RESEARCH ON ANCIENT PIGMENTS AND POLYCHROMIES TODAY: A BIRD'S-EYE VIEW

The past decades of scholarship have seen major multidisciplinary breakthroughs in integrating studies of the surface of ancient architectural and sculptural environments and color as an inseparable element of appearance and meaning. Academic scholarship accepted that research on the cultural use of pigments, their production, and concepts of paint application is an important dimension to consider. Paintings, color, light, and related material components evoked agency; they were part of the sensation of things. Today, the work of painters and of those involved in painting-related processes and technologies can even be studied as part of a community with sometimes far-reaching consequences as we understand aspects of ancient and more recent aspects of colonialism and workforce exploitation.³

The *Cambridge Archaeological Journal* dedicated a special section of one issue to the subject of color. In 2002, a major anthology on color in anthropological research appeared, offering analyses of great relevance to studies of the role of color in premodern societies.⁴ At the same time, David Batchelor's (2000) inspirational yet not uncontroversial *Chromophobia* focused attention on historiographic issues by contemplating allegedly orientalizing trends that have

² Recent discussions on the art of Achaemenid Persia include Jacobs 2021b and chapters in Dusinberre et al. 2020. On the history of Achaemenid Persia and its modern legacies, see, e.g. Briant 2018; Brosius 2021; Daryaei et al. 2014; and the chapters in Jacobs and Rollinger 2021.

³ Early pigment application and trade in Africa and western Asia: Brooks et al. 2018; Schotsmans et al. 2022. On aspects of colonialism and workforce exploitation related to pigments, in the New World: Magaloni Kerpel 1994, 2010, 2014, 2019.

⁴ Gage et al. 1999; Jones and MacGregor 2002. See also Sahlin 1976.

shaped current western approaches to a “white” antiquity in which color was a sign of eastern degeneracy. His observation that it would be “one thing not to know that . . . statues were once brilliantly painted; it is another thing not to see colour when it is still there” has been guiding me ever since.⁵ Some of this scholarship built upon and has occurred within a fertile environment of empirical research on vestigial color on ancient North African and eastern Mediterranean architectural and sculptural finishes in particular, with far less systematic and wide-ranging exploration of the abundance and opportunities offered by monuments in western Asia. Of the numerous studies related to the creation, dissemination, and legacy of polychromies in the ancient eastern Mediterranean in general, I have found the research of several colleagues most enlightening.

With their sophisticated work on ancient sculptural polychromy, Brigitte Bourgeois and Hariclia Brekoulaki have been pushing the field for many years.⁶ With their sights on ancient painted surfaces, Bourgeois and Brekoulaki each stand at the forefront in locating blind spots between those studying ancient painting and those studying ancient sculpted monuments. Such blind spots certainly exist between scholars working on sculpture and painting in western Asia, too, as we will see in this book. If nothing else, scholarly interest in refining methods for approaching ancient polychrome sculpture has increasingly helped retire the aging discourse concerning the supremacy of painting or sculpture rather than their collusively affective properties. Fresh explorations and meticulous transdisciplinary investigation into the original polychromies of Neo-Assyrian palaces and the North African world are an intriguing development.⁷ Exciting work has been done on fourth-century BCE eastern Mediterranean painting, where much is preserved from funerary-related contexts.⁸ Future investigations in these realms will enhance our ability to deal with the backdrop of traditions informing the craftsmen of the Achaemenid Persian court, too.

In their introduction to an edited volume on aspects of color in the world of Islam, Sheila Blair and Jonathan Bloom acknowledge the many references to

⁵ Batchelor 2000, 12.

⁶ Bourgeois 2012, 2014a, 2014b; Bourgeois and Jockey 2001, 2003, 2010; Brekoulaki 2010, 2011, 2014, 2015, 2016, 2021.

⁷ Brøns et al. 2018; Davies 2001; Dawson et al. 2010; Fulcher 2018, 2022; Hartwig 2013; Laboury 2012; Le Fur 2016; Nunn 2022; Nunn et al. 2015; Nunn and Piening 2020; Rodler et al. 2022; Sue 2015; Thavapalan et al. 2016; Thavapalan 2019; Verri et al. 2009.

⁸ Adornato et al. 2019; Manetta 2019. There are well-preserved contexts in Macedonia and Thrace adding much to our knowledge about painting in western Asia where it remains challenging for scholars to define and distinguish between Achaemenid, satrapical, and Greek contexts (see fn. 28). I disagree with scholars who claim something “looks Greek” or “Greco-Persian” or “provincial.” Much of this ground has been covered by Jennifer Gates (2002).

color in written texts and revelations such as the holy Qur'an, addressed also by commentators in Islamic science and scholarship, even though the authors in their volume focus less on the polychromatic aspect of monuments created in the Persian world and deal less with texts referring to the production of these paints and materials, which I see as a missed opportunity.⁹ As art historian Lawrence Nees reminds us in the same volume, Qur'anic citations of the color blue, for example, find reflection in monumental inscriptions of the Dome of the Rock and elsewhere, often in the form of gilded letters on blue backgrounds. Documentation of such inscriptional strategies and stressing the importance of highlighting text messages as features on monuments in the world of Islam are now known to have been significant features of much earlier Achaemenid Persian monuments already, as we shall see in Chapters 3 and 5. But how can we contextualize these features in a community of artisans, craftsmen, and those who executed the painting beyond the idea of symbolism?

It is true that prominent features of color symbolism in later Iranian cultures may well extend back in time to traditions of color iconographies already established in the Achaemenid Persian heartland. Blue is a color frequently referred to, appearing (as a sign of mourning) in the first verses of Ferdowsi's poetic masterpiece of roughly 1000 CE, the *Shahnameh* (Book of Kings), for example. Cuneiform tablets inform us that it was a blue lapis stone on which the Epic of Gilgamesh was written by the ancient site of Uruk, and lapis is referred to in a number of ancient texts and excavated items.¹⁰ Blue has also been a predominant color in later Iranian painting.¹¹ The application of paint on monuments in general certainly played a major role at the Seleucid, Parthian, and Sasanian courts, not least through the different colors known to have characterized the crowns of the Sasanian ruler, and there is historic evidence for paint on reliefs such as those at Taq-e Bستان and on the colossal statue of Shapur I near Bishapur.¹² This is another area in which cross-temporal and

⁹ Arnold 1965; Bloom and Blair 2011, 14; Holakooei 2016; Thackston 1990. By contrast, there are many studies on the role of pigments and its trade alone in western Europe: Kirby et al. 2010; Krischel 2011; Matthew 2011.

¹⁰ Excavated raw lapis at Susa: Thomas 2016, no. 64 (= Louvre Sb 23957); Casanova 2002; see Chapter 5.

¹¹ Purinton and Waters 1991.

¹² Sarre and Herzfeld 1910, 205. The French delegation in Persia crafted plaster molds from the Sasanian Taq-e Bستان reliefs in 1899. These are today in the Louvre in Paris: Demange 2007, 22 (casts: Louvre AO 31900 and AO 31906). These molds might still preserve traces of original paint, even though earlier centuries already encountered white façades: Allen and Carey 2021, 291 and figure 8.9 (illustration from 1410). Other evidence for the polychromy of Sasanian monuments: Abkai Khavari 2000, 31–3; Morgenstern 1939, 1373. The aspect of polychromy on this colossal statue of Shapur is not mentioned in Reza Garosi 2009. Traces of paint at a Sasanian relief in Central Asia: Grenet et al. 2007, 248. See Miri 2022. One ungrounded sculpture preserved with abundant polychromy from a Sasanian site: Kröger

cross-cultural explorations may ultimately bear fruit as our eyes are open now to such opportunities. Yet a systematic inquiry into the role of polychromy and surface embellishments on architectures, combined with research on recipes for pigment preparation and technologies applied is a desideratum for the Seleucid, Parthian, Sasanian, and Islamic world, too, while so much progress has been made in understanding what happened at the same time in their European counterparts.¹³ Would it not be feasible to compile and compare the evidence one day on this practice and its meanings across cultures in western Asia from antiquity deep into Islamic times, Safavid and Qajar art, up to today?

Turning to very different historical and cultural spheres, much progress has been made on understanding aspects of polychromies on stone in Mesoamerica and the New World in general,¹⁴ offering innovative and dynamic cross-cultural methodological comparanda of great interest. It was Glenn Wharton's (2012) *The Painted King: Art, Activism and Authenticity in Hawai'i* that was particularly thought-provoking for me, after I had finished my dissertation. On many levels, Wharton's keen observations – though focused on aspects of contemporary polychromies and conservation, have helped me grapple with some ideas related to a discussion of aspects of preserving architectural and sculptural polychromy in distant times. Wharton actively sought the cooperation of contemporary communities in his attempts to preserve the polychromy of a nineteenth-century statue of a king in rural Kapaau, North Kohala in the Central Pacific. This effort revealed interesting nuances in the favor or resistance of local people to the whole idea of revitalizing the colors on the old image in their land. Wharton had to negotiate a culturally determined new fear of color among the people, which related to intertwined aspects of cult discontinuity and religion.¹⁵ There are disjunctures between the reception of color in social environments different from those for which a monument was originally created. Take, for example, the case of a marble sculpture at Candia on in Crete in the eastern Mediterranean, which has been repainted repeatedly as part of an engagement with the history of the specific site.¹⁶ Problems of this sort led, as we shall see, to a rejection at certain eras of

2021. Recent work on polychrome stucco panels excavated throughout western Asia is summarized in Dentzer-Feydy et al. 2019; Muller 2019. Of particular interest are the stucco works excavated in the heartlands of Iran such as in Bishapur and in Ray: Boucharlat 2019; Thompson 1976; Conference: "Stucco Decoration in the Architecture of Iran and Neighbouring Lands: New Research – New Horizons," University of Bamberg, May 4–7, 2022, especially Karimy and Holakooei 2022.

¹³ Boldrick et al. 2002; Brodrick 1993, 2001; Clarke 2001; Deuber-Pauli and Hermanès 1981; Hulbert 1998; Marincola and Kargère 2020; Park 2002; Senserich et al. 2017; Sinclair 2000; Sobieczky 2022; Steyaert 2013; Taubert 2016; Verret and Steyaert 2002; Victoir 2012; Vuillemand 2001; Wallert et al. 1996; Weeks 1998.

¹⁴ Houston 2009; Siracusano 2012; Trever 2017. ¹⁵ Wharton 2012, 103–23.

¹⁶ Greenberg and Hamilakis 2022, 120 figure 5.2.

modernity of the fact that ancient sculptures in western Asia were once lavishly painted, too. Western elite aesthetics cultivated a taste for “whiteness” early on, as the tastes of a classical antiquity were reimagined as reflecting a world of pristine white surfaces.¹⁷ Many more recent monuments created in both the Old and New World, such as an equestrian sculpture of Nasir ad-Din Shah in Tehran in 1888, the memorial dedicated to Ferdowsi in Tus (1924–68), the rock carving of four U.S. presidential portraits on Mount Rushmore (1927–41), and the Washington, DC, sculpture dedicated to Martin Luther King (2011), were left white with no applied color.¹⁸ Was this in an allusion to the nobility of an ancient (European?) past? Who decides whether we should repaint the Sistine Chapel in the Vatican or add new layers of paint to a Rembrandt painting when original paint recipes are now longer available?¹⁹ Are aesthetic preferences and economic concerns the only reason why we do not repaint monuments? Spoiler alert: we are still working on answering these questions.

Questions such as these lead us right into modern engagements with ancient writings on the senses. Much has been published on aesthetics in the ancient world, on the affective roles of architecture and sculpture in ancient societies and on the impact of their displays of richness, beauty, and wonder.²⁰ The inspiring polychrome creations by Vinzenz and Ulrike Koch-Brinkmann have had a great impact on me for a discussion of polychromy’s property of “breathing life” into ancient monuments. Exhibitions and sometimes critical responses continue to bring explorations of ancient polychrome monuments to wider audiences.²¹ As the work of art historian Bissera Pentcheva made clear, painted icons and figures on Byzantine wall paintings could have been perceived as moving. The well-kept polychrome sculptures in the Sacro Monte di Varallo in Northern Italy, first painted in the sixteenth century, are a fine example in that they still provide an unforgettable sensory experience to visitors just because polychromy has been maintained until today.²²

¹⁷ Jockey 2013.

¹⁸ Nasir ad-Din Shah: Kreiser 2008; statue of Ferdowsi: Grigor 2009a; Mount Rushmore: Smith 1994. For remarkable exceptions in Iran in the twentieth century, see Chapter 6.

¹⁹ Bomford and Leonard 2004; Van de Wetering 2007. See, also, the thoughts summarized in González Mozo 2016. One of the more comprehensive recent introductions to the art of painting in Iran (Pakbaz 2000) has still not been translated into English.

²⁰ Day 2013; Destrée and Murray 2015; Garelli 1990; Hamilakis 2014; Lepinski and McFadden 2015; Neumann and Thomason 2021; Winter 1995, on responses to polychromy here, particularly Grand-Clément 2015; Mason 2016. For the concept of *xvannah*, “brilliance” in Iran, see Battesti 2011.

²¹ Brinkmann 2015; Brinkmann et al. 2017; Katsaros and Vasiliadis 2019; Leka 2018; Stubbe Østergaard 2017; Stubbe Østergaard and Nielsen 2014.

²² Pentcheva 2006, 2010; Terry-Fritsch 2015. For an example of a contemporary artist who bought ancient sculptural fragments only to repaint these: Besnard 2019 (artist: Francesco Vezzoli).

A major concern of mine relates to the challenges of polychromy preservation and allied concerns of cultural heritage. Here, I have benefited greatly from rereading articles and monographs on these issues that I originally pursued as a doctoral student about to begin to explore the rich world of polychromies at Persepolis in 2006. I am still very inspired by the texts compiled in *Historical and Philosophical Issues in the Conservation of Cultural Heritage* edited by Nicholas Stanley-Price, M. Kirby Talley Jr., and the late Alessandra Melucco Vaccaro (1996), and by Elizabeth Pye's (2001) *Caring for the Past. Issues in Conservation for Archaeology and Museums*. Chinese archaeologists have begun excavating more terracotta warriors and were faced with the question on how best to preserve the perfectly retained original polychromies while documenting aspects of the original polychromy as have those who work on the polychromy of the Bamiyan buddhas.²³ At the same time, pigments themselves have become embroiled in global politics, as two German researchers were accused of scratching off samples of paint from a major ancient monument in Egypt in August 2013.²⁴ This incident ironically shows the significance currently accorded to pigments as scientific data. Of course, the care and protection of the surface of these ancient monuments is our first priority, ensuring that future generations may enjoy and learn more about the polychrome past. I will address aspects of care with respect to the monuments in Persepolis, Naqsh-e Rostam, and Susa in Chapter 4.

The chapters in this book offer case studies in my own very personal approach to the challenges and opportunities of exploring polychromies on ancient western Asian architecture and architectural sculpture. They mainly focus on the limestone monuments on the site of Persepolis, a ceremonial and administrative center in the very heart of the Achaemenid Persian Empire between 520 and 330 BCE, and include evidence of and commentary about polychromies at Achaemenid Naqsh-e Rostam near Persepolis, Pasargadae, and Susa (Šuš) in modern Khuzestan, ancient Elam.

At first glance, the long files of gift-bearers and soldiers depicted on the monumental reliefs of buildings in Persepolis all looked the same to me, too: an endless repetition of monochrome stone carvings. I realized over the course of my studies that the surface of all façades and monuments on the site must once have been a visual bombshell and that it needs creative technologies and thinking to reconstruct their polychromies. I became aware that pigments and colorants must have played a significant role in the ancient environment, just as nuances of iconography offered compelling messages.

²³ Blänsdorf 2005, 2008, 2021; Bonaduce et al. 2008; Hu et al. 2014; Portal 2007; Yongqi et al. 2001; contributions in Aoki et al. 2021.

²⁴ Kuhrt 2013.

At the end of the day, there was the sunset and there were flowers and gardens that filled Persepolis, Susa, and all the other Achaemenid residences. There were perhaps parrots, as the ancient authors have described, and shouting peacocks with beautiful plumage, flying birds and butterflies too, helping to shade the individual colors already applied to the buildings, inside and outside. All the polychrome embellishments were brought together for the aim to please the king, the courtiers, and their guests and to form a shining palace complex and a site with colors that would become an impressive monument of outstanding character and visual seduction. This book can offer only a glimpse into the methods of how we may approach the polychrome in Achaemenid Persia. The book is a success if the reader understands it as an invitation to enter into the scientific discourse of researching aspects of pigments, paints, and polychromies at Persepolis.

VEILS AND FILTERS: POLYCHROMY STUDIES AND ANCIENT IRAN

Much has happened since I began my inquiries to understand better the traces of polychromies preserved at Persepolis in 2006. I was able to bring equipment to the site with the permission of regional authorities in Fars and Iran and the kind help and collaboration of Stefan Simon and Marisa Pamplona, then at the Rathgen Research Laboratory in Berlin. Several campaigns followed in museums around the world, on fragments from Persepolis, Naqsh-e Rostam, and Susa in Berlin, in Chicago, in Washington, DC, and elsewhere, often in collaborations with local scientific staff. This book does not offer a detailed description of all the campaigns, many of which had different aims and have been introduced in other writings. To be sure, Iranian colleagues are actively working on the preservation and protection of the site. There are excellent research facilities and laboratories at academic institutions in Iran. In 2010, an Italian team resumed earlier work on the surface of selected monuments to explore further avenues of research on ancient Persepolitan polychromies, and new excavations around the site began. Their first results are very promising.²⁵ It is my aim to provide a call for consideration of ways we may move forward to expand upon and beyond finding further physical evidence of ancient surface decoration. Ultimately new types of investigation demand collaborative programming of the goals and methods of humanists, conservation scientists – field archaeologists, anthropologists and art historians, philologists, museum-based professionals, and cultural heritage specialists. I aim to wed results from ongoing analysis of empirical data on polychromy on the monuments with contemplations of the significance and meanings of paints and

²⁵ Amadori et al. 2021; Askari Chaverdi et al. 2016; Ridolfi et al. 2019.

color historically, socially/anthropologically, and within discourses of orientalist bias and site documentation in the nineteenth and twentieth centuries.

As mentioned previously, today all surviving Achaemenid monuments on the sites introduced in this book appear in shades of gray, black, or pale yellow; this is the color of the stone structures that were originally fleshed out with a brick superstructure, which was often finished with colorful decorative glazed brick façades. An intended polychromy is, however, evident even with the choice of the stone material itself. At sites such as Pasargadae and Borazjan, different aesthetics were achieved by the use of colored stone from different quarries.²⁶ As I had noted earlier when writing my dissertation, the appearance of the stone of the monuments at Persepolis today depends in part on their exposure to the elements: pale yellow is the color of monuments that had been exposed longer to the elements while the grayish appearances defines many of those excavated since the nineteenth century. Marisa Laurenzi Tabasso and Lorenzo Lazzarini recently remarked that the “pale gray colour is not a natural discoloration of the weathered stone, but . . . due to the presence of a thin, rather fine, whitish layer applied on the stone surface.”²⁷ The implications of these observations are large. With Ernst Herzfeld and others I do believe that all the stone elements of the architecture were originally embellished with bright colors as well as in some cases with gilding and, occasionally, with inlays or applied ornamentation. Additionally, painted wood, stucco, and clay were used abundantly. But such materials have been poorly preserved. Contemporaneous evidence, however, exists in some cases from the provinces of the Achaemenid Persian empire.²⁸

Polychromy was a critical factor in how these ancient monuments were meant to be perceived: it was the embellishments of architectural surfaces, carved reliefs, and incised inscriptions that initially captured the visual attention. These features of color were apprehended from a distance and they were a considerable element of the iconography of the built environment at closer range as well.²⁹ As a result of aging, weathering, the ravages of war and site-pilfering over the centuries, and of dubious methods of site documentation in

²⁶ Pasargadae: Emami et al 2018; Nylander 1970; Borazjan: Kasiri et al. 2020.

²⁷ Laurenzi Tabasso and Lazzarini 2017, 109–10.

²⁸ By coincidence or not, recent years have witnessed a renaissance of studies and exciting new discoveries related to painting activities in the provinces of the Achaemenid Persian Empire, both in the East (wall paintings at Dahan-e Ghulaman, Sistan: Sajjadi 2007; Sajjadi and Saber Moghaddam 2004), in Anatolia, Elmalı, Tatarlı, Can, and Mylasa (e.g. Işık 2019, c. 376 BCE; Rose 2014, esp. 129–42; Summerer and Kienlin 2010), and east of Sulaymaniah in Iraq (Bahrani 2017, 300–2; Rezaei 2021). Focused research will enable us to compare the mechanics and technologies used in the application of paint as well as aspects of color symbolism throughout the empire.

²⁹ An experiment on the Nashville–Parthenon aimed to address aspects of visibility on monuments: Wescoat and Levitan 2017; see also Marconi 2004, 2009.

the past, most of the added surface decoration is no longer visible, originally attached metal and precious stone applications are lost, and gilding is preserved in only tiny traces. Here, I collate, evaluate, and integrate empirical information gleaned from preliminary data from several seasons of work on-site and in museums around the world between 2006 and 2022. I deal with how we may best (in my view) think about the nature of the empirical data, hoping to clarify some ongoing issues that vex the study of polychromy and continue to cause problems in the effective exchange of ideas between humanists and conservation scientists in this arena. And I discuss what all this means for any future-directed understanding of the appearance and agency of color and polychromy in the Achaemenid environment.

I strive to open up a dialogue, making this book a very modest beginning to a wide range of future studies. I call attention to a few aspects that might shed new light upon some unanswered questions in archaeological theory concerning polychromy by introducing and discussing observations made on the site, on objects in modern museum collections, and, most important, on the modern perception and reception of the polychromies of Achaemenid Persian art. I offer a series of thematic explorations on the issue of Achaemenid Persian polychromies. With the constituents and materials that polychromies consist of as material discourse in the center, we can address issues of the availability of raw materials, aspects of pigment application and surface treatments, of the aesthetic functions of polychromy and focus on the relationship between the significance of color and the Achaemenid courtly environment.

By using the monuments of Achaemenid Persepolis, Naqsh-e Rostam, and Susa as a case study, I build upon and hope to move beyond the documentary work of earlier researchers, such as Charles Texier, Jane and Marcel Dieulafoy, Ernst Herzfeld, Erich Schmidt, Judith Lerner, and Giuseppe and Ann Britt Tilia. I hope to show that the polychromatic aspect of these sites is fundamental to any understanding of their overall appearance and meaning. The case studies demonstrate, I hope, that investigations of polychromy are crucial in shaping broadly scientific narratives in material culture studies.

ORGANIZATION AND OUTLINE OF THIS BOOK

In the first three chapters, I will deal extensively with aspects of modern cultural history and reception. In Chapter 1, I lay out a theoretical framework by providing a definition of what I consider modern academic research on polychromies of ancient western Asia is about. The term polychromy has become increasingly popular, so its meaning has become stretched well beyond what was originally intended. Its changing definition has now become part of an engagement with the remains of the ancient western Asia material

culture landscape. One aim of this chapter is to explain to the reader the complexities involved when applying modern (for the most part western) philosophies and terminologies onto the ancient environment. Is the term polychromy the right one to use in the context, and what does it entail?

In Chapter 1, I also begin excavating some prevailing modern views on ancient polychromy. I deal with the beginnings of the modern reception of ancient western Asian polychromies, by investigating how the residues of paint have been encountered by early antiquarians, and how these antiquarians appreciated, displayed, and took care of them in modern museums far removed from the sites since the nineteenth century. Questions of competing aesthetics and display, concepts of authenticity and preservation, conservation, and the rather aggressive aspect of mold making and casting feature heavily, because these practices were crucial factors in hampering the development of polychromy studies in modern art history discourse as I see it.

By introducing pamphlets and letters related to the ongoing discussions and a very ambitious experiment in reconstructing an ancient polychrome environment with a set of painted plaster casts in the Crystal Palace in Sydenham in greater London in 1854, I hope to show that the nineteenth-century layperson was (at least in London, but also in other cities such as Paris, Munich, and later in Washington, DC) much better educated in understanding the complexities of the polychromy of ancient palaces than is the modern museum visitor, no matter how harshly these (re)constructions were criticized by those who thought they knew better. Reviewing the history of the modern recovery, interpretation, and reception of polychromy allows me to show that each generation favored its own polychrome version of ancient western Asia.

In Chapter 2 the Achaemenid Persian Empire and the sites of Persepolis, Naqsh-e Rostam, Pasargadae, and Susa, take the stage. My research can be contextualized within the framework of the extensive research conducted over the last decades on the ideology of this empire. Scholars have used the program of Achaemenid palatial structures, as well as the royal textual rhetoric, as a major historical source that had efficacy as a tool shaping and reinforcing the imperial project itself. Fifth-century BCE Persepolis is now understood better as a *social place*, not least owing to ongoing work on remarkable texts preserved on the Persepolis Fortification archive tablets and the seals that ratified these imperial disbursement records in the reign of Darius I (c. 550–486 BCE).³⁰ But there is also exciting ongoing archaeological fieldwork and exploration that aims to understand the landscape of human activity around the proper Takht.³¹ Among the many aspects revealed by the archives excavated on the Takht is

³⁰ Henkelman 2008 and later Briant et al. 2008; Garrison 2017; Garrison and Root 2001; Root 1979, 1997; 2008; Chapters in Jacobs and Rollinger 2021.

³¹ Askari Chaverdi and Callieri 2017a, 2017b; Gondet 2011, 2015.

the clear evidence of work crews from around the empire (and not least from Egypt), who contributed to the technical background that ultimately informed the implementation of imperial designs. Thus, a study of issues and approaches to polychromies in Persepolis and Susa engages us in an interconnected world of labor traditions that inform the case at hand and also works to increase our understanding of the practices of other ancient imperial settings.

Persepolis and Susa occupy a unique position as the heartland bases of the Achaemenid rulers, who were so reviled as the quintessential *barbarian* enemy in ancient classical literature and in modern Eurocentric traditions based upon them. In this discourse, color (like many other elements of an imaginatively reinvented “Persia”) becomes a surrogate for effeminacy and degeneracy, for despotic luxury and dissolute hedonism.³² Thus, approaching the polychromies of the Achaemenid Persian Empire can bring us full circle from documentary projects on the actual material remains to issues of modern (and ancient) reception. Chapters 2 and 3 draw extensively on a very diverse set of primary sources – notebooks, letters, and archival documents left behind by those who excavated on the site. Beginning with Chapter 2, I will review the specific situation and early stages of the detection of pigments attached to the monuments of Persepolis and Susa and answer several questions: How did early travelers and archaeologists encounter, detect, and document the polychrome environment of the ruins? How did they communicate their observations? I also introduce and contextualize some results of more recently conducted and ongoing scientific analysis of the polychromies of selected monuments in Persepolis. We can gain important insights if we stay focused on the history of excavation and conservation of monuments on the Persepolis platform regarding the detection of pigments, colored substances, and painted motifs.

In Chapter 4, I address the thorny issue of conservation and preservation of the original paints on the monuments. What was and what was not undertaken to preserve the paints on the monuments? I show how well-intended documentation strategies of the past two hundred years may have destroyed important evidence for our understanding of the polychromy of Persepolis and Susa. I concur with the opinion of the late Alessandra Melucco Vaccaro (1940–2000), who argued that “art historians and curators of major museums were the very ones responsible for destroying traces of color, patination and toning layers, . . . The ravages of time and pollution have been nothing compared to the damage done by restorers: removal of the surface and violent cleaning with hot water and ashes, or washing with sponges soaked in nitric acid, have almost completely destroyed any traces of polychrome finish spared

³² viz., Hall 1989; Miller 1997.

by the effects of time.”³³ Both Chapters 4 and 5 contain my interpretation of previous scholarship read against my own fieldwork since 2006.

In Chapter 5 we will return to the site of Persepolis and look at the evidence introduced in preceding chapters from a different angle. I introduce scenarios of the ancient *chaîne opératoire*, a concept that has been used in anthropological research in recent decades.³⁴ In addition, I will argue that the choice of color schemes, painted patterns, gilding, and ornaments was designed not only to enhance the surface of monuments. They also served additional functions, including to evocate and resonate with meanings of precious materials. The concept of what I have come to label *imperial polychromy*, can be supported by comparative evidence in the choice of color applications by governing elites in other premodern and more recent cultures. It can also be understood against the backdrop of pre-Achaemenid cultures in the regional and contemporaneous cultures that shared craft traditions across the Achaemenid Persian Empire.

In Chapter 6, I argue for the great potential for archaeologists, historians, and conservation specialists to pursue further aspects of the polychromy of Achaemenid Persia. I discuss how modern Iran, especially during the Qajar period, itself did envision and respond to its colorful past, revived ancient imperial polychromies, and whether there is evidence that a western concept of “chromophobia” took over Iran, indeed, too. I conclude with some general remarks and outline suggestions for directions of future research.

³³ Melucco Vaccaro 1996, 369.

³⁴ Martinon-Torres 2002.



1.1. Painted sculptures from the Façade of the Nineveh Court, Sydenham, London, 1859 (Philip Henry Delamotte Collection). Note the bull-headed column capitals on the upper floor, inspired by recent excavations at Susa. Photo. Courtesy of the Historic England Archive

CHAPTER ONE

DEFINING POLYCHROMIES

In this chapter I lay out a theoretical framework by providing a definition of polychromy as used in this book. I review the development of polychromy studies and deal specifically with the early stages of the modern reception of ancient western Asian polychromies. I investigate and explore how the surface of ancient stone monuments, particularly of Assyria, has been encountered by antiquarians, archaeologists, and museum curators and how the polychromies have inspired, been displayed, and appreciated since the nineteenth century. This is not an exhaustive survey. Within this framework, however, issues of competing definitions, aesthetic debates and movements, as well as aspects of influence from polychromy debates in relation to other ancient civilizations such as Egypt, Greece, and Rome, loom large. At the more recent end of this engagement stands Batchelor's (2000) *Chromophobia*. Batchelor argued that nineteenth-century European thought laid much of the ground for a fear that color would eventually "take over" the values of western civilization. He suggested that it was in the nineteenth century that color became "forcefully" excluded and abolished from a presumed universal western mindset, because it was seen as a "corruption of culture" implicitly tied to "the feminine, the *oriental*, the primitive, the infantile . . ." ¹ It is mainly for this reason that for many decades, scholars trained in a European-American tradition, and

¹ Batchelor 2000, 21–3, emphasis mine.

increasingly scholars trained around the world, have conceptualized and presented the past as predominantly “white.”

A critical survey of almost two hundred years of reception allows us to appreciate the often emotionally charged discourse on the topic and to gain some understanding of the tensions and controversies that have plagued the field. In my historiographical review, questions of authenticity, preservation, conservation, and display (including the controversial practices of cast-making and cast-coloring for museum presentations) feature prominently. In my view, these factors played a crucial role in both the development and the subsequent stagnation of polychromy studies among historians of the art of ancient western Asia.

TRANSLATIONS

Any attempt to study the polychromy of a specific type of culture, material, or site must start with a definition of the word itself. It is important to precisely define what we are talking about and to set this issue of definition into its own historiographic context. Our modern word polychromy is derived from the ancient Greek *polychrōmatos*, which simply means many-colored or multicolored. It is found only a few times in texts from classical antiquity.² Early on in ancient texts traditionally used by scholars, the word *poikilia* (“marking with varied colors”) is attested, too.³ As many modern scholars have come to apply the term polychromy to other cultures as well, in studies on ceramics, textiles, and other materials, it is worth looking at its modern origins again.

Already in 1765, the term “polychrome” was used in the *Encyclopédie*.⁴ “Polychrome” was then explicitly sanctioned for use in modern discussions of ancient art by the Frenchman Antoine Chrysosthôme Quatremère de Quincy (1755–1849). He discussed the origins, meanings, and significance of the word in his lecture “Un mémoire intitulée: Recherches sur l’origine, les causes, l’emploi, le goût et la durée des statues d’or et d’ivoire chez les Grecs et les Romains, ou dissertation sur la sculpture polychrome des anciens” in October 1806 in the Parisian Académie des Beaux-Arts. According to David Van Zanten the term *polychrome* was a common term among academics in the nineteenth century and was often used and translated with other words such as *particolored*.⁵

² E.g. Strabo *Geographica* 15.1.22. *Polychrōmatos* is used interchangeably with *polychrōos* and *polychrōus*: Koch 2000, 38 with further references.

³ Grand-Clément 2015.

⁴ Diderot and Le Rond D’Alembert 1765, s.v. “peintres grecs” and “peinture des Grecs.”

⁵ Van Zanten 1977, 83 n. 33; Bourgeois 2008; Middleton 1982, 176. General useful treatises on the debate on ancient polychromy in the nineteenth century can be found in Billot 1982; Drost 1996; Knipping 2001; Türr 1994.

The idea and the sense of the word is preserved in ancient and modern languages used in western Asia, too, of course. In Farsi, the meaning is conveyed in *فن تهیه نقوش الوان*, and in *تعدد ألوان* in Arabic. In the poems by Ibn al-Jayyab (1274–1349), some of which are preserved on the walls of the Alhambra in Spain, we learn about “different designs . . . either polychromed (muzakhraf) or gilded (mudhahhab).”⁶

Because the term polychromy in its basic lexical sense of many-colored is indeed so broad, it can legitimately embrace, when applied to the ancient environment, myriad media. These media include multicolored dyed or woven textiles, ceramics, painted wooden beams, wall paintings, glazed brick reliefs and tiles, and architectural and sculptural details made of materials such as stones and glass in contrasting colors. Materials include portable objects such as furniture embellished with ivories overlaid with pigment application, gilding, and added ornamentation in semiprecious stone, sculpture with metal attachments, jewelry (especially cloisonné work) with multicolored inlays, and stone vessels covered with paints (for such examples, see Chapter 5), in short everything that would fit into a multicolored ancient universe, and especially into the “rhetoric of abundance”⁷ in the ancient world. Indeed, one scholar has proposed that “polychromy can refer to *any decorative art* involving the use of several colors.”⁸ The complex situation in assigning a clear definition of polychromy in ancient art is well demonstrated in modern philological discussions and in the vocabulary used for multicolored textiles from Mesopotamia (*gūna-a*), Assyria (*birnu*), and, most important, Elam.⁹ The Akkadian word *birnu* derives from the word *barāmu*, “to be multi-colored.”¹⁰ At least one weaver of colored cloth, Nādin-a/i, was active during the reign of Darius in Uruk.¹¹

In modern scholarly discourse on sculpture, however, the term polychromy has been used inconsistently and has generated great debate. Ian Paterson himself, who offered the inclusive definition given previously, simultaneously referred to polychromy quite restrictively as “the *process* of painting or staining

⁶ Bush 2009, 132, 141; Bush 2011, 55; Makariou 2003. ⁷ Winter 2003.

⁸ Paterson 2003, 309, emphasis mine.

⁹ Rossi 2021; Rossi and Basello 2011; Villard 2010, 397; Waetzoldt 2010, 201. While aspects of polychromy are featured, the term itself is not discussed in Alvarez-Mon et al. 2018. Multicolored textiles in Mesopotamia: Gaspa 2017; Joannès 2010, 2014; Quillien 2020; Zawadski 2006, 2010, 2013; Multicolored textiles in Greece: Brøns 2017. Archaeologists excavated a few textile fragments at Persepolis and Susa. Nagel 2021a, 1362–3. In 2020, Hamid Fadaei announced a new project collaboration with the Research Center for Conservation and Cultural Relics of the ICCHTO [Ministry of Cultural Heritage, Handicrafts and Tourism of Iran] aiming to organize and study the carbonized fabric fragments excavated on the site. This research is currently undertaken by Dr. Shahrzad Amin Shirazi.

¹⁰ Gaspa 2017, 79–80; Quillien 2020, 212 n. 64; Stol 2021, 196; Thavapalan 2019b, 81.

¹¹ Payne 2008, 184–5.

in several colors, *in particular, as regards statues and bas-reliefs*.”¹² I will return to Paterson’s idea of polychromy as a process later in this book.

Although we are told of numerous ancient treatises on sculpture and artistic practices in classical texts, these are not extant for the Achaemenid sphere, making it impossible to state whether the word and the related concept would have appeared more than we can currently state. In his review of the literary evidence of Greek and Roman writers on art, Pollitt does not contemplate the issue of polychromy or the possibilities of what we might have learned from them regarding the interface between sculpture, architecture, and painting.¹³

Further tensions are revealed in Paterson’s understanding of how he wants the term to be applied when, in the same passage, he offers the following definitions, which return to his most inclusive approach: (1) polychrome means “having many colors in contradistinction to monochrome, that is also used as a noun to refer to a work executed in many colors”; (2) polychromatic means “having many colors”; and (3) polychrome *sculpture* means “a colored sculpture.” In this last phrase, he reasserts his inclusive definition of polychromy by defining a special category of polychrome *sculpture* within that large open category. Paterson’s alternative definition (which restricts polychromy to painterly techniques of surface application of color onto existing sculptures, architecture, or other works of art) is emblematic of a serious tension in the field even today. It is crucial to explore the competing ideas in scholarship as to what qualifies as polychromy in the study of ancient art.

Most scholars of ancient art today conform to Paterson’s restrictive definition, considering polychromy to be limited to multicolored features added to preexisting three-dimensional forms such as relief sculpture or statuary in the round. Previous scholars have, however, complicated issues of definition regarding the issue of wall painting and its impact on the discussion. How does the concept and process of polychromy (as this is generally applied to the coloring of preformed modeled compositions) relate to the concept and process of applying paints to walls in the form of murals? Astrid Nunn, who wrote a landmark monograph on wall paintings and glazed wall decorations in ancient western Asia, provided no clear definition of polychromy. She did, however, include a short chapter on ancient western Asian painted relief sculpture and sculpture in the round.¹⁴ Here, she argued that the topic of mural wall painting should be treated separately from such material: “The issue of paint on orthostats and stone reliefs does not directly belong to the topic of wall paintings.”¹⁵ Was Nunn making a distinction, because in her understanding, color was applied to ancient sculptures only as detailed work on certain

¹² Paterson 2003, 309, emphasis mine. ¹³ Pollitt 1974, 12–31. ¹⁴ Nunn 1988, 229–35.

¹⁵ Nunn 1988, 229: “Die Bemalung von Orthostaten und Steinreliefs [gehört] nicht unmittelbar zum Thema der Wandmalerei” (trans. mine).

limited surfaces of the forms and thus was not similar to the concept of wall paintings? Nunn did, however, acknowledge the fact that paint preserved on sculptures helped her consider the use of color and the painter's palette on murals. In contrast, Ursula Seidl seemed to incorporate wall painting and other modes of polychromatic architectural decoration under the rubric of polychromy.¹⁶

In my view, Nunn's separation of painted relief sculpture from painted walls is not productive. From the craftsman's perspective, the raw materials of painted color (i.e. the minerals and pigments themselves), and the process of applying them on relief sculpture, statuary in the round, and wall painting can often be the same. There is no firm reason to believe that the tools of applying paints onto walls and stone reliefs were different unless the ground material for the walls was different from stone. Rather, as Michele Marincola has proposed, the "techniques of polychromy on sculpture often parallel those of two-dimensional painting in the same culture."¹⁷ Particularly for Neo-Assyrian palace art, Roger Moorey (1937–2004) had argued for a "close relationship of painter and sculptor" as "emphasized by the use of applied colour on the reliefs." He also noted that the Neo-Assyrian palace reliefs were in fact "two-dimensional drawings rendered in relief," and that "it is likely that their execution was influenced from the outset by the techniques of wall painting . . . The design would be sketched in, in ink, then the background cut away."¹⁸ Moorey further remarked that the palette of pigments used was identical on relief sculpture and mural arts. It is well known that wall paintings appeared directly above the painted reliefs in the very same Neo-Assyrian palace interiors.¹⁹ We must consider wall paintings and painted reliefs as part of one production process that took place in these rooms. The result was an integrated *polychrome program*.²⁰

As with later Achaemenid décor, Neo-Assyrian palace environments included polychrome glazed brick embellishment along with mural painting and painted reliefs, painted ivories and other décor. An index of the modern

¹⁶ Seidl states that the term "many-colored" (German: *Vielfarbigkeit*) is mainly a "Bezeichnung für die Farbigkeit, die einer auch unabhängigen bestehenden Form zugefügt ist (Architektur, Rundbild, Relief), und deren Einzelfarben ohne Übergang nebeneinander gesetzt sind" (Seidl 2005, 599). The "forms" Seidl is referring to would not exclude wall paintings per se as these are part of architecture.

¹⁷ Marincola 2004, 1319. This has been recently stressed by Brinkmann (2007, 61) for the field of Greek polychromy, where a carved relief is "typologically closer to painting than sculpture in the round."

¹⁸ Moorey 1994, 35 reinforcing Moortgat 1959, 130–1; Moortgat 1959, 19: "Die Malerei ist . . . vielmehr mit den anderen Kunsthandwerken, Toepferei, Baukunst und Bildhauerei, so eng verbunden, dass sie sich von ihnen nicht abtrennen laesst."

¹⁹ Albenda 2005; Guralnick 2010; Kertai 2015, 235–7; Loud 1936, 67; Moorey 1994, 326; Rassam 1897, 28.

²⁰ This would be in line with the proposal of the definition by Zink 2019.

comingling of these media is found in the ambiguity of translations of a wording in a statement of King Assurnasirpal II (c. 883–859 BCE) in which the ancient text refers to the representation of his triumphs *zaginduru* “in paintings.” Moorey reiterated Mallowan’s observation that these “paintings” may in fact have been glazed brick decorations.²¹

Turning to the close of the Achaemenid period, evidence from the so-called Alexander Sarcophagus is important. This monument, found in Sidon in 1887, and dating to the late fourth century BCE, combines deeply carved relief sculpture that preserves remnants of a lavish polychromy with motifs painted on the interiors of the shields of the sculpted Persian warriors in the manner of miniature murals to provide details of the famous Audience scenes excavated at Persepolis.²² It is of great interest that the motifs painted on these shield interiors are directly inspired by Achaemenid monumental sculpture known to us from Persepolis. We also note that in Persepolis paint was used to create patterns and detailed motifs on certain architectural reliefs that in other instances were rendered in carved form (see Chapter 3). We can compare the patterns of walking lions carved in relief on the royal baldachins of the original central panels of the Apadana or the door jambs of the Hall of 100 Columns to the patterns of walking lions once rendered in paint ornamenting the throne covers and royal robes as preserved via incised painters’ guidelines on figures from the Hall of 100 Columns, the main Hall of the Harem building, and the Tripylon.²³

The close connection between polychromatic murals and architectural reliefs is well attested through evidence from Persepolis and Susa together. The discoveries in the 1970s at Susa revealed remains of almost life-size mural paintings, rendering the motif of gift-bearers from the subject lands, echoing at approximately the same scale the famous carved stone reliefs on the Apadana at Persepolis.²⁴ Crossovers between reliefs in stone (originally painted) from both Persepolis and Susa are attested abundantly at Susa also in colorful glazed brick

²¹ Moorey 1994, 326. See Mallowan 1966, 67. In the original publication by Wiseman 1952, 30, 36 the text was translated as follows: (l. 31) “My glorious valor in the regions of the mountains and seas . . . and the conquest of all their lands I drew in glazed (works) on their walls (l. 32), I caused bricks to be baked with blue (glaze) and set (them) above their doors.” See, now: Marchetti 2009; Tudeau 2019, 111 n. 49. On new research on glazed façades in the Elamite context: Abdali 2018 and Holakooei 2020; Mannaean art: Binandeh et al. 2017 and Hassanzadeh and Curtis 2021; Assyrian context: Gries and Fügert 2020. Research on the glazed bricks from Babylon and Borsippa, important for the regional context: Amrhein et al. 2019; Gries 2022; Kaniuth 2013, 2018; Rodler et al. 2019; Thavapalan 2019b; Zessin 2019.

²² Blume 2015, 281–7; Brinkmann 2007, 154, figures 284–7; Graeve 1970, 102–9. The same details of the Audience scene are featured upon bullae excavated at Daskyleion: Kaptan 2002.

²³ Tilia 1978, 46, figure 3 and plate 33, figures 39–40; Schmidt 1953, plate 105; cp. Naster 1974.

²⁴ Boucharlat 2013, 402–3, figures 466–9; Labrousse and Boucharlat 1974.

relief and equally colorful flat glazed tiles. The motif of servant-figures carrying vessels, containers, animals, or other gifts for the ruler up staircases is a prominent example of this in all three modes.²⁵ This medium is closely tied to the concept of mural painting and, as noted previously, may have been considered one and the same phenomenon in the ancient mind (namely, Assurnasirpal II). There was no necessary distinction between what motifs and scales of production were appropriate for polychromy renderings in mural work, glazed brick, and glazed brick relief. In features of technical production (as opposed to decorative concept), Annie Caubet compared the mode of application of polychromy on the glazed bricks from Susa with the jewelry technique of *cloisonné*.²⁶ This observation reinforces the impression of the fluidity of craft interconnectivity in the sphere of polychromatic vision, design, and implementation at the Achaemenid Persian court. It helps open the door ultimately to reconsideration of the broadest and most inclusive of definitions of polychromy.

What about the texts preserved from Achaemenid Persia? Terminology for relevant craft techniques used at the Achaemenid Persian court is ambiguous, fluid, and hardly restrictive, in the official languages and those languages used in everyday life. Here, the modern researcher has to wait for extended philological scholarship programs in the future. The Old Persian term *patikarā* (p-t-i-k-r-a), as attested in texts, has been translated by Roland Kent (1877–1952) as “picture, (sculptured) likeness.”²⁷ Others, however, translated *patikarā* as “counterfeit, re-production.” Pierre Grelot (1917–2009) translated the term as “sculptor,” as did Whitehead, Tuplin, Tavernier, and others, who equate Aramaic *ptkrtr* with “sculptor” and Iranian *patikarakara* with “maker of statues.”²⁸ The word is rooted in the idea of likeness, not in the technique of sculpture per se.²⁹ Kent’s parenthetical suggestion of *sculptured* likeness is inferred by him from the fact that the uses of the word in extant texts happen to refer to sculptural monuments. *Patikarā* is used in the inscription of Darius I at Bisotun (DB IV 66, ll. 72–7 – Kent 1953, 132, followed by Schmitt 1991, 72) and in his tomb inscription (DNa 4, ll. 30–47 – Kent 1953, 138). At Bisotun (DB IV 67, ll. 76–80), Darius exhorts,

²⁵ Other examples of crossovers between stone relief and glazed brick in either relief or flat decoration include files of confronting guards, antithetically-posed sphinxes, lion and floral motifs (see, e.g. Muscarella et al. 1992).

²⁶ Muscarella et al. 1992, 223.

²⁷ Cameron 1948, index 209; Cameron 1958, 166; Kent 1953, 194; Roaf 1980.

²⁸ Grelot 1972, 70; Roaf 1980, 73 n. 5; Tavernier 2007, 35, 429; Tuplin 2013, 100, 104; Whitehead 1974, 84–9; for “image-maker” in an Aramaic translation on a parchment letter related to Arsama, the Persian satrap of Egypt in the late fifth century BCE. See also the extensive discussion in Briant 2002, 457.

²⁹ Tuplin 2013, 105 n. 259: “The fundamental etymological connotation of the word [i.e. *patikara*] at any date is counterfeit or reproduction.”

If thou shalt behold this inscription or these sculptures, (and)
 shalt destroy them and shalt not protect them as long as unto thee there is
 strength, may Ahuramazda be a smiter unto thee... (trans. Kent
 1953, 132)

These texts refer to the representational imagery on two monuments both of which happen to be in the form of sculpted stone rock reliefs. Discussing the terminology for sculptors and sculptures at the Achaemenid Persian court, Michael Roaf argued (correctly in my view) that the term *patikarā* should be appreciated as similar to the Babylonian word *salmu* (sal-ma-a-nu), which “had a similarly wide range of meanings: statue, relief, drawing.”³⁰ The English translation as “image” comes closest.

Evidence from other texts produced in the empire does not provide a great deal of information that would allow us to see distinctions the court might have made in discussions of the *techniques* of wall painting versus painted relief sculpture versus polychrome-decorated glazed bricks in the rendering of “likeness.” The trilingual Susa Foundation Charter texts (DSf 3i, ll. 40–5—Kent 1953, 144; Lecoq 1997, 236; Kuhrt 2007, 492 for the Old Persian) state,

The ornamentation with which the wall was adorned, that from Ionia
 was brought. . . (trans. Kent 1953, 144).

But it is unclear what type of wall ornamentation would have been “brought” presumably ready-made from afar: textiles perhaps? A later section of the same text (DSf 3i, ll. 45–9 – Kent 1953, 144; Lecoq 1997, 236; Kuhrt 2007, 492 for the Old Persian) goes on to stipulate a series of distinct jobs performed by specified and discrete ethnic groups:

The stone columns which were here wrought, a village by name of
 Abiradu, in Elam—from there were brought. The stone-cutters who
 wrought the stone were Ionians and Sardian. . . (trans. Kent 1953, 144).

This passage suggests some differentiation of craft specialties relating to different types of adornment that would have yielded the polychromy of architectural monuments that we can glean from physical evidence at the sites of Persepolis and Susa. This text is, however, an imperial statement of power over and integration of conquered lands rather than a treatise on artistic practice.³¹ Accordingly, it must be treated in those terms.

Elamite administrative documents from Persepolis cast light on this subject in a genre that is not governed by ideologically driven rhetoric. One Persepolis Treasury tablet (PT 27), dating from the reign of Artaxerxes I (462/1 BCE)

³⁰ Roaf 1980, 65.

³¹ Namely, Root 1979, 11; Root 2010, 186 with further references, see Chapter 5.

refers to “makers of inlay, makers of reliefs (?)”.³² The modern challenge to find an adequate translation is interesting in that it brings together these two crafts in a citation of what appears to be a single work project. Several Elamite administrative documents from the large Persepolis Fortification tablet archive refer to craftsmen and -women. Some of these texts do categorize explicit distinctions between types of crafts engaged in the decoration of the palatial installations of Persepolis. Richard Hallock (1906–80) translated the Elamite term *karsup* as painter;³³ George Cameron (1905–79) translated the Elamite term *hatena hutira* (PT 78) as an ornament maker; Hallock, however, suggested a mirror maker.³⁴ The Elamite term *beasiskurraspe* (PT 30, PT 62) was understood as ornament maker by Hallock.³⁵ A plasterer (?) is perhaps attested as *du-uk-kaš*, too.³⁶ Goldsmiths and silversmiths are also mentioned in the tablets.³⁷ More philologically grounded discussions of intertextuality in professions would offer one way to overcome our limited understanding.³⁸

Recent work by Matthew Stolper, Wouter Henkelman, and colleagues have updated our vocabulary and knowledge significantly, especially as to the role of women involved. PF-NN 0898, for example, a tongue-shaped memorandum, which was edited first by Hallock, has now been collated and translated by W. F. M. Henkelman as follows:

150 (l.) barley, (01–03) allocation from Zazzap, (03–04) Lullu received. (11) He gave it to them, (04–05) to female dependent workers, (05–06) (who are) female painters (*karsup*), (06–08) for whom Attebaka is responsible, (09) (who are) exhausted, (10) as *kamakaš* (a bonus ration) (12) for 10 months, (13) 18th year (504/03 BCE).³⁹

A second tongue-shaped memorandum preserved on a clay tablet (Fort. 2341–106), initially edited by Matthew Stolper, was collated and translated by W. F. M. Henkelman as follows:

(01) 21.7 (?) l. flour, (02) allocation from Kanimanba, (03–04) Dayukka and his companion(s) received. (08) They fed (?) it to (04–05) female dependent workers, female painters (*karsup*) (05–06) at Itema, (06–07) for whom Tandupirdana (*Šandupirzana*) is responsible. (09–10) They received it during 6 months (10–13) and 35 female dependent workers

³² Cameron 1948, tablet no. 27; Kuhrt 2007, 788 no. 19.

³³ PF 1110, 1111, 1169 = Hallock 1969, 711. ³⁴ Kuhrt 2007, 789 no. 21.

³⁵ Hallock 1960, 99–100; 1969, 677.

³⁶ PT 49a = Cameron and Gershevitch 1965, 175; PT 76:5 = Hallock 1969, 682; PT 10a = Arfae 2008a,b,c.

³⁷ PF 872 = Kuhrt 2007, 794 no. 29; PF 874 = Kuhrt 2007, 795–6 no. 33.

³⁸ There have been several attempts to disentangle these complexities for the Egyptian world and other cultures: Drenkhahn 1995; Jäger 2004; Laboury 2016; Quirke 2018.

³⁹ PF-NN 0898 is accompanied by two seal impressions (Seals: PFS 0273s left edge, PFS 2423 upper edge). I am grateful to Matthew Stolper and Wouter Henkelman for facilitating the translation and permission to include the translation here.

each monthly received 1 l. (13–14) 23rd year (499/98 BCE). (15) Included in this there is 1 l. (as) *karmaziš* (a bonus ration) for each 5 (of them). [remainder broken].⁴⁰

In a recent discussion on the concept of *decor* in Assyrian buildings based on texts, Johanna Tudeau expanded our modern ideas about this important aspect of ancient monuments in another fruitful direction by including nonvisual techniques such as fragrances, which certainly played a major role, too.⁴¹

With some notable exceptions, the evidence we have to date on these matters reinforces the general impression that the Achaemenid court considered the production of various forms of ornamentation as part of a larger whole. Distinct specialties that contributed to the polychromy of the whole surely existed (such as inlay work versus relief carving), and will have had their own histories in the many languages spoken among the craftsmen on the sites; but on the level of payments and disbursements, a craftsman was a craftsman to a large degree. Many were engaged simultaneously on a multimedia presentation that included a variety of techniques to produce lavish displays of surface decoration. All of this leads me to propose that polychromy, properly defined, should indeed refer to any decorative art involving the use of several colors.⁴² The ideal ultimate goal in studying the polychromy of the Achaemenid imperial environment would be to incorporate an integrated analysis of the entire spectrum of color array from the many and varied manifestations I have suggested. Within the parameters of this book I will, perforce, focus primarily on painted and gilded royal stone monuments of the Achaemenid heartland capitals of Persepolis and Susa. But my restrictive focus is not a statement of a restrictive definition of polychromy. Instead, it reflects the practicalities of one project that is preliminary to a much larger endeavor. Therefore, I will attempt to place these monuments in the context of a polychromy of the Achaemenid courtly environment that embraces a holistic concept.

DOCUMENTING, EXTRACTING, AND PRESENTING POLYCHROMIES FROM ANCIENT WESTERN ASIA

The now-“white”⁴³ Persepolitan stones displayed on the sites discussed here and those in museums and galleries in Persepolis, Susa, Chicago, Tehran, Paris,

⁴⁰ Fort. 2341–106 has unidentified seals on the left edge and the upper edge. I am grateful to Matthew Stolper and Wouter Henkelman for facilitating the translation and permission to include the translation here.

⁴¹ Tudeau 2019, 106–23. Tudeau noted that there is no Akkadian equivalent for the modern word “painting.”

⁴² See Paterson 2003, 309.

⁴³ I am using the terms “white” and “whiteness” in a metaphorical sense. I am aware that different limestones were used on the site of Persepolis, coming from various local quarries that yielded various shades of this stone (Laurenzi Tabasso and Lazzarini 2017; Tilia 1968, 76;

London, and New York create the image we have in mind, and even recent films have shown ancient imagined palatial environments with white sculptures.⁴⁴ This “whiteness” has shaped our imagination. We have perceptions of urban environments created in specific ancient and modern cultures in mind: we associate the modern domestic architecture on the Cycladic islands in Greece with clear white, blue, and rather plain color schemes, as we associate modern Rome with its terracotta and claret-brownish colors, though they were remarkably different in earlier periods.⁴⁵ The history of the detection, subsequent perception, and aesthetic evaluation of the once colorful walls and sculptures of the palaces of western Asia over the last two centuries can be contextualized in these ideas. It is as complex as it is a fascinating tale of competing ideas of interpretation and public presentation of polychromy.

Educated western people of the early nineteenth century read the classical authors and the Bible. These sources left no doubt that the past was a polychromatic environment: colorful columns and reliefs adorning the walls of the palaces in Babylon are mentioned in these texts. According to Ezekiel 23:14–5 (perhaps recording scenarios of the sixth century BCE) in the palaces of Babylon “there were men portrayed on the walls, the images of the Chaldaens portrayed with vermilion, girded with girdles upon their loins, exceeding in dyed attire upon their heads, all of them princes to look to, after the manner of the Babylonians at Chaldaea” (trans. Fisch 1985).⁴⁶ According to the Greek historian Strabo (writing in the Augustan Age), the Babylonians “wind ropes of twisted reed around the columns and then they plaster them and paint them with colors” (*Geographica* 16.5.1, trans. Jones).⁴⁷ As we will see in the following overview, many experiments in nineteenth-century public displays reinforced the notion of a richly colored ancient Assyrian and Babylonian environment. This, as we will see, also contradicts Batchelor’s *chromophobia* concept.

Zare 2004). Most of the Persepolitan stone sculptures in major western collections and in the Tehran museums have been (in some cases) heavily treated and polished. This and closely related issues will be discussed further partly in Chapter 4. In a metaphorical sense, the term “white” in this book equates “naked.” For specific qualities of limestone and aspects of its modern conservation: Durnan 2006. Informative introductions on aspects of stone conversation: Doehe and Price 2010; Henry 2006; Siegesmund and Snethlage 2014.

⁴⁴ Elley 1984; Garcia 2008, esp. 21–2; McGeough 2022.

⁴⁵ Lange 1995; Lenclos and Lenclos 2004; Swinoff 2000.

⁴⁶ For discussions on color terms from ancient sources in nineteenth-century scholarship see, e.g. Brenner 1982, 1989, 1999.

⁴⁷ Strabo’s commentary needs, of course, to be treated with caution. It can be discussed whether his account is describing a Babylon of his own era or a Babylon of the past.

APPROACHING ANCIENT WESTERN ASIAN POLYCHROMIES: THE
FIRST DECADE (1843–1853)

The first wave and the bulk of archaeological fieldwork in the early first millennium BCE Neo-Assyrian palace complexes at Khorsabad (ancient Dur-Sharrukin), Nineveh (Kuyunjik), and Nimrud (Kalhu), today in modern Iraq, took place between 1842 and 1855.⁴⁸ Paul-Émile Botta (1802–70), Eugène Flandin (1809–76), Austen Henry Layard (1817–94), and Victor Place (1818–75) frequently referred in their reports to traces of paint on the monuments, glazed bricks, painted plaster, and other materials related to the painting process.⁴⁹

In April 1843 Botta announced an abundance of paints still to be observed on the stone monuments at Khorsabad in letters to Paris.⁵⁰ Hand-colored plates accompanied Botta's earliest publications on the palaces of Khorsabad.⁵¹ Once removed and transported to Europe, the impressive original monuments from the ruins of the Assyrian palaces soon became attractions in museums and salons. Museum curators were aware of the traces of paint discovered by the excavators.

The first reliefs and sculptures reached Paris in December 1846. In February 1847, Adrien de Longpérier (1816–82), *Conservateur de la deuxième division des antiques du musée royal qui comprend les monuments égyptiens de toutes les époques, les monuments orientaux et arabes, indiens, etc.* at the Louvre in Paris, continued to comment on considerable traces of paint on the architectural sculptures from Khorsabad.⁵² The Louvre's public galleries devoted to Assyrian art opened only a few months later in May 1847. On display were also glazed bricks and raw pigments, including a large number of blue and green materials, excavated

⁴⁸ A great number of recent monographs and articles have dealt with the arrival and reception of ancient monuments from western Asia in nineteenth-century Europe and the Americas: Bahrani et al. 2011; Bohrer 2003; Cohen and Kangas 2010; Hagenauer 2015; Kertai 2015; Larsen 1996, 2017; Malley 2012; McGeough 2015; Micale 2008; Thomas 2008; contributions in Nadali and Micale 2015; Petit and Morandi Bonacossi 2017. Art historical approaches: Brown and Feldman 2014. Nineteenth-century reception of Achaemenid Persian monuments in Europe, especially England: Allen 2007; Harrison 2007.

⁴⁹ Albenda 1986, 33; Botta and Flandin 1846–50; Chevalier 2016; Flandin 1845; Layard 1849. Large lumps of actual pigments were excavated in Khorsabad. For a discussion of this critical evidence, see Chapter 5.

⁵⁰ Botta 1843, 1844. ⁵¹ Guralnick 2002, 28–30; 2010, 782.

⁵² Longpérier 1854, e.g. 29 no. 5: “La barbe, les yeux et les sourcils portent des traces très sensibles de couleur noire et blanche”; 31 no. 7: “Les yeux et la barbe conservent des traces de couleur”; 32 no. 10: “Les yeux, les cheveux, la barbe, le diadème, la tête de l'ibex et la fleur de lotus sont encore peints”; 32 no. 11; 33 no. 13; 34 nos. 15–6; 35 no. 17: “Le diadème est d'un rouge très vif”; 35 no. 18; 35 no. 19; 36 no. 21; 37 no. 26; 38 no. 29: “La couleur des jambes et des sandales est encore très reconnaissable”; 38–9 no. 30: “La tête des chevaux est surmontée d'une sorte de *crista* peinte en rouge, . . . ; 40–1 nos. 32–4.

by Botta and Place, leaving no doubt about the colorful environments of these ancient palaces.⁵³

These were the words of Austen H. Layard on the colors observed on the monuments of the freshly excavated reliefs from the series of Neo-Assyrian palaces excavated by the British:

The hair, beard, eye brows, eyelids and eyeballs, black; the inner part of the eye, white; the king's mitre, principally red; the crests of the helmets, blue and red; the heads of arrows, blue; the bows, red; the handles of maces, red; the harnesses of horses, blue and red; sandals, in the oldest monuments, black, edged with red; in those of Khorsabad, striped blue and red; the rosettes in the garlands of winged figures, red; trees at Khorsabad, a blueish green; flowers carried by the winged figures, green, with red flowers occasionally; fire, always red.⁵⁴

The modern recovery of traces of polychromy on these ancient stone monuments itself needs to be read against the significant discussions of Mediterranean and, to a lesser extent, ancient North Africa, specifically Egyptian polychromies in the first half of the nineteenth century. Both Botta in Mosul/Paris and Layard in Mosul/London were rooted in an environment where theoretical discussions of the extent and function of polychromy on Greek and, to a much lesser extent, Egyptian sculpture loomed large. Proving the very existence of polychromy itself seemed a considerable accomplishment.⁵⁵ Already in 1845, in discussing the polychromy of the stone reliefs excavated at Khorsabad, Flandin used traces of paint to conceal a large measure of aesthetic preconceptions. Opening his brief discussion by commenting on the rather annoying (“fâcheux”) impression the colorful reliefs would have

⁵³ Longpérier 1854, 44–9 nos. 48–210; For the glazed bricks now Thomas 2016, no. 211; Thomas 2020.

⁵⁴ Layard 1849, vol. 2: 312. Further comments on paint: 306, 309, 310; passage here cited from Stearns 1961, 20 n. 40. See also the reference by Reade 2008, 15 n. 2 quoting from the original notebook of Layard: “Bracelets on arms painted black/crossing with red edging/mace handle red/Tiara of king, horse reins and/orament above red/Handle of dagger below head of/animal-blue/the head a reddish brown/orament all black pecked with red/the knob or rope near leg, blue/bracelets red. Tassels ditto.”

⁵⁵ Even though color engravings were part of a limited deluxe edition of the invaluable *Description de l’Égypte* (1809–28) and left no doubt about the original polychromy of ancient Egyptian monuments, see the plates in the volumes published with Panckoucke 1809–28 (e.g. vol. I: plate 18: “The Hypostyle of the Main Temple of Philae Perspective View”; vol. II: plate 12, “Thebes-Medinet-Abou”; plate 89, “Thebes-Byban el Molouk”), their impact on contemporaneous discussions on ancient polychromy has not received sufficient scholarly attention. The polychromy debate was also relevant for contemporary architecture in Europe: Billot 1982; Crinson 1996, 33–5; Middleton 1982; Van Zanten 1977. It is apparent that nineteenth-century European architects were inspired by and soon adapted ancient Egyptian polychromy into exterior façades, e.g. the 1823 façade entrance of the library of Devonport in Plymouth, or the so-called Egyptian House in Penzance in Cornwall, built in 1835 (Curl 2005, 264–6).

made on the viewer, and on the difficulties contemporaries faced when imagining the phenomenon, he joins the ongoing debate about aspects of polychromy on ancient Greek stone sculpture:

How difficult it is to understand that the Greeks, with all monuments having been built with materials of the finest quality, . . . and whose architectural ornaments they executed so finely, decided to conceal the imprint chisel of their skilled sculptors under layers of blue and red.⁵⁶

Though Flandin is harsh in judging the aesthetics, his comments on the actual polychromy of the Neo-Assyrian palace reliefs are far from clear:

I would not dare to claim that the walls of the palaces at Khorsabad were entirely colored, and to me there is no certainty regarding that question. It may be that only some parts of the bas-reliefs were painted, and that in order to make them more visible, the walls were left untouched for most of the surface, and only some items were colored. However, I do not think that such was the case.⁵⁷

Rather, Flandin argued, it would be due to matters of conservation and stability of the pigments and binding materials that not all colors are visible anymore. The issue of fragility, conservation and preservation was indeed a very important one, to which I will return later in more detail. Flandin made one more important observation: that the paints applied on the reliefs in the Assyrian palaces were the same as those applied to the monuments in Egypt.⁵⁸

In 1847, the first relief sculptures from Layard's excavations conducted in the ruins of the Neo-Assyrian palaces arrived in London. Attempts to reconstruct the *original* colors of these palaces soon followed. In his *Nineveh and Its Remains*, Layard published four chromolithographic plates, among them one imaginary reconstruction of an Assyrian interior, brightly colored⁵⁹ (**Figure 1.2**).

Layard's concept of ancient western Asian polychromy was developed together with the architects Owen Jones (1809–74)⁶⁰ and James Fergusson

⁵⁶ “Ce qui se comprend plus difficilement, c'est que les Grecs, dont tous les monuments ont été construits avec des matériaux de la plus belle qualité, . . . et dont les ornements architectoniques étaient si finement exécutés, aient pu se décider à cacher l'empreinte du ciseau de leurs habiles sculpteurs sous des couches de bleu et de rouge” (Flandin 1845, 106, trans. mine).

⁵⁷ “Je n'oserais point avancer que les murs des palais de Khorsabad étaient entièrement coloriés, et, à cet égard, je suis dans le doute. Il est possible que certaines parties seulement des bas-reliefs aient été peintes, et qu'afin de produire plus d'effet, en laissant la pierre dans un état naturel sur les grandes surfaces, on n'ait colorié que quelques détails; cependant je ne le pense pas” (Flandin 1845, 106, trans. mine).

⁵⁸ Flandin 1845, 107.

⁵⁹ Layard 1849, vol. 1: plate 2; On the important role of chromolithographic publications of ancient architectural polychromies in nineteenth-century academia, see now Hassler 2019; Hennemeyer 2017, 2019; Twyman 2013.

⁶⁰ On Jones: Hrvol Flores 2006, and later in this chapter.



1. 2. Interior of an Assyrian palace (after Layard 1849, vol. 1: pl. 2). The place of “plate 2” in art history has recently been restudied by Ada Cohen and Steven Kangas. Photo: Alamy Stock Photo

(1808–86). Both men figured prominently in the antiquarian discourse on ancient polychromy at this time. Significantly, the elaborate reconstruction we see in their reconstructions cannot be taken as a precise illustration of Layard’s direct observations of the archaeological record. Some color schemes differ markedly from Layard’s written descriptions. In retrospect, it is not clear what purpose these reconstructions may have served: To stimulate interest in polychromy? To raise funds for future excavations?

In 1851, Fergusson stated that the new discoveries of Assyrian palaces

were of greatest importance in relation to the question of polychromy, being in fact the authority for its employment by the Greeks; and a proper study of them would go far to throw light upon the question . . . The Persians, however, from the days of Nineveh to the present time, used colour most extensively; covering their mosques entirely with painted tiles, and relying more on colour than on form for the effect to be produced.⁶¹

⁶¹ Cited by Donaldson 1851, 45.

The interest in publicizing the color of these great monuments could best be seen in museum and museum-like presentations of the day. Shortly after the arrival of the Assyrian reliefs in London, various parties made requests for casts. Some collectors requested colored casts for display alongside their privately held original fragments of Assyrian reliefs in order to show how the now monochrome originals once looked. In a letter to Layard in May 1850, for example, Henry Danby Seymour (1820–77) requested that a cast of a relief from room I of the northwest palace of Nimrud be made so that it might be painted to replicate its presumed original colorful appearance.⁶²

Somewhat contradictory information about the nature and extent of the polychromy that once adorned the monuments circulated soon thereafter. In 1853, Joseph Bonomi (1796–1878) argued that besides the observed red, blue, and black, it appeared that the

colours were more varied, and that the whole surface of the bas reliefs was coloured with them. On the bricks there are other tints: . . . yellow, white, green etc. There is no reason why the Assyrians should have used these latter colours on their bricks, and not have employed them to paint their sculptures. It is much more natural to suppose that the portions not at present coloured were coloured formerly.⁶³

Bonomi is one of the important individuals Nunn overlooked in her attempts to distinguish between nineteenth-century scholars who interpreted the archaeological remains as indicating an only partial coverage in color and those who favored a total polychromy. The situation is indeed very complex.

⁶² “I want a cast taken of the sculpture, and to have the cast coloured as it is supposed the sculpture was. It will stand like a fire-screen with the sculpture on one side and the painted cast on the other” (Reade 2008, 11; BL 38979: 231; letter, May 18, 1850).

⁶³ Bonomi 1853, 327–8; Bonomi is a less well studied character in debates on polychromy in the nineteenth century. He was in close contact with Botta and Coste (Crimson 1996, 32). The Bonomi papers and correspondence are held today at the Cambridge University Library, Department of Manuscripts, and include communications with Layard and Fergusson. I plan to study this documentation in the near future.

The question of polychromy in ancient palaces of western Asia is addressed less explicitly in the publications of William Vaux (1818–85), assistant keeper in the Department of Antiquities in the British Museum from 1841. In *Nineveh and Persepolis* he argued that “two colors: red and blue have stood the test of time . . . The blue is generally extremely bright.” (Vaux 1850, 195).

Meetings held on January 12, 26, and February 9, 1851, at the Royal Institute of British Architects in London addressed “polychromatic embellishments in Greek architecture.” Speakers included Hittorf, Semper, and Penrose, but also experts on Egyptian and Assyrian polychromy like Fergusson, Jones, Hector Horeau (1801–72), and Gothic revival architect Joseph Scoles (1798–1863). In these meetings it was argued that the architecture of the Greeks could not be understood without studying their polychromy (Donaldson 1851, 44). An important landmark in the intellectual reception of ancient polychromy, again focused only on the polychromy of ancient Greece and Rome, published at this time is Semper 1851a. On Semper’s approaches to ancient polychromies: Pisani 2003; Rehm 2019.

Although Nunn is right that Layard advocated for an only partial decoration of the stones, this is true only of his scholarly writings. His actions in terms of public display and representation of the colors on the façades of these ancient monuments indicate that he was conflicted on this issue. Indeed, he offered an alternative version of the monuments in a total polychromy of vibrant colors.

REINVENTING ANCIENT WEST ASIAN POLYCHROMIES:

SYDENHAM (1854–1866)

Throughout the first half of the 1850s, Layard, Fergusson, and Jones collaborated in a campaign to influence the public to accept and think about the use of color and ornament, the polychromatic enrichment of built environments, because, in Jones' own words, "England was far behind in employment and appreciation of color in then contemporary interior and exterior decoration."⁶⁴ An important part of this campaign was their creation of a dramatic installation of painted plaster casts and reconstructions of an ancient Assyrian palace in the Crystal Palace in Sydenham in south London. Painted Achaemenid Persian architectural features were included in the form of bull-headed capital columns.

The Crystal Palace, which opened to the public in June 1854, was a private initiative to show recent developments and progress in technology and production.⁶⁵ This "world trade fair" was successful. The public was quite drawn to the fair, with visitor numbers much higher than in the museums of the city of London, counting over 1.3 million visitors every year with 32,000 tickets sold every week. One contemporary witness stated that the Crystal Palace is "the grandest educational institute the world has yet seen."⁶⁶

The Fine Arts Court within the Crystal Palace, with its showing off of ancient and medieval art work, played a rather small but interesting role. Today, the Nineveh Court remains an important phenomenon in the history of the reception of ancient polychromy in the nineteenth century (**Figures 1.1, 1.3–1.4**). The Nineveh Court was located next to the foot of

⁶⁴ Cited in Piggott 2004, 75.

⁶⁵ The literature on the Crystal Palace is vast. See, more recently, Nichols 2015. On the displays discussed here see Bohrer 2003, 212–8; Collins 2020; Piggott 2004, 109–12; Rehm 2022. Jones had already been involved as a superintendent for the exhibition and the arrangement of displays in the *Great Exhibition*. After the closing of the *Great Exhibition* in 1851, Jones became involved in re-erecting the Crystal Palace at Sydenham. Together with architect Matthew Digby Wyatt (1820–77), Jones undertook the design and furnishing of the Fine Arts Court. As a result of coloring the monuments in the Greek Court, Jones was obliged to publish an *Apology* (Jones 1854), in which he was assisted by his friend, the philosopher George Henry Lewes (1817–78).

⁶⁶ Anon. 1854a, 246. Visitor numbers: Nichols 2015, 5, 19. Polychromy in the Greek and Roman courts: Nichols 2015, 74–7.



1.3. Façade of the Nineveh Court, Sydenham, London, c. 1859. Album, British Library. Note how the paint of the columns and column capitals here differs from the photographs depicting the same structure. © British Library Board/Robana/Art Resource, NY

two of the four famous statues of the Egyptian temple complex of Abu Simbel each measuring 15.5 m and crafted in blocks of plaster “covered in red, yellow and blue house paint ordered by hogshead,” who reminded one visitor of “clowns in a circus.”⁶⁷ With the Nineveh Court, Layard, Fergusson, and Jones created their own vision of the ancient palatial environments. The court highlighted vibrantly painted casts of architectural reliefs from Nineveh, Nimrud, and Khorsabad set into a structure. In this combination the exhibition lacked historical specificity, but such was obviously not the aim. The color schemes applied to the casts and the galleries displaying the monuments were

⁶⁷ Anon. 1854b, 258. See the perplexed comment by Samuel Leigh Sotheby (1805–61), a Crystal Palace shareholder: “I happened to be at the Crystal Palace when the casts were first being painted . . . At that moment I was pleased with the novelty, and so expressed myself to Mr. Bonomi. The next day, however, I called, telling him I had quite regretted having entertained such an opinion” (Piggott 2004, 87). The Nineveh Court was situated in the northwestern angle of the Crystal Palace (cp. Hrvol Flores 2006, 120–1, plate 2.21 watercolor; Leith 2005, figures 63–5 photographs; Piggott 2004, esp. 109–12).



1.4. Nineveh Court, Crystal Palace, Sydenham, London, detail. Nineveh “Assyrian” court from gallery between 1855 and 1890. Musée d’Orsay, Réunion des Musées Nationaux et du Grand Palais, Paris. Photographer: Negretti & Zambra. Photo: Art Resource

executed by a London-based company (Leonard W. Collmann, renowned interior decorator of Curzon Street), and were probably painted by workers from western Asia.⁶⁸

⁶⁸ Piggott 2004, 47.

The painted casts were described in detail by the contemporary guidebooks.⁶⁹ According to one guidebook, the casts of the “animals . . . were in chocolate on buff grounds, or blue on red, or red on blue. The bulls of the portal were deep dull red with black beards and hairs, their mitres blue and yellow.”⁷⁰ In the accompanying catalog, Layard explained in an authoritative voice how the choices of colors were made:

The arrangement and contrasts of the colors have been carefully studied, and when there has been no authority for their use in any particular instance, a comparison with other monuments and especially with Egyptian remains have, in some instances, furnished the means of deciding which to adopt. It may appear strange and unnatural to us that color should be employed in all parts of such an edifice, and that even sculptures and bas reliefs in various materials have been painted. But that such was the case in Assyria, as indeed in Egypt and in ancient Greece, can now no longer admit of a doubt, and in restoring an Assyrian palace, it would have been absurd to omit so essential a feature of Assyrian architecture. From the remains of gold leaf continually found in the ruins, it would appear that gilding was profusely employed in the Assyrian palaces. It is even probable that many parts were overlaid with gold leaf . . . Care . . . has been taken to consult every authority upon the subject. The traces of color still existing on the monuments discovered at Nineveh, especially upon those at Khorsabad, have been minutely examined, and have furnished sufficient data for the painting of most of the bas-reliefs and architectural details.⁷¹

Significantly, although many original fragments from Persepolis and casts from monuments taken from the site were housed by this time in the British

⁶⁹ “Fergusson, assisted by Mr. Layard, has erected the court before which the visitor now stands – an architectural illustration which, without pretending to be a literal copy of any one building, most certainly represents generally the architecture of the extinct but once mighty kingdoms of Mesopotamia, during the two centuries that elapsed between the reign of Sennacherib and that of Xerxes, namely, from about B.C. 700 to B.C. 500” (Layard 1854, 52, 53–4).

⁷⁰ Piggott 2004, 111.

⁷¹ Layard 1854, 53–4, 59. According to the general guidebook (Phillips 1854, 26), the walls of the Nineveh Court were “ornamented with paintings, either on plaster or enameled on the bricks . . . Having completed his survey of the interior of this Court, the visitor may . . . glance at the exterior of the Court he has just quitted, the bright coloring of which – the bold ornaments, the gigantic bulls, and colossal features, present as novel and striking an architectural and decorative display as the mind can imagine.” Layard does not give any more detailed description of the colors and paints used for the reconstructions. Evidence for the color schemes comes from reproductions of contemporary watercolors by Joseph Nash (1808–78), and photographs. While the hair and beards of the colossal lamassus were painted black and the face in the same color as the body (or only slightly brighter), the horned crown was left white with a system of dots and golden horns, as well as an upper crown of blue leaves. It is also clear that Jones and Fergusson preferred contrasting color schemes for the Persepolitan inspired lintels.

Museum in London (see Chapter 2), almost none of this material was featured alongside the Assyrian casts. The upper floor of the Nineveh Court was composed of an elaborate balcony reconstruction meant to suggest the superstructure of the Assyrian palaces. Ironically given the sidelining of Persia here on its own terms, only the columns of this balcony were actual replications of the complex Achaemenid columns from Persepolis and Susa, complete with their great bull protome capitals.⁷² These fabricated bull capitals were completely painted. Existing reproductions indicate that they were painted in blue. Was the yellow we see in John Nash's reproductions of the constructions of the Nineveh Court an indication that Jones and Fergusson were convincing in promoting that original façades might have been gilded?

The Nineveh Court stood out as a landmark experiment in the portrayal of a polychrome ancient palatial environment for the general public. Notwithstanding the excitement the polychrome casts generated, they also met with harsh criticism. For some contemporaries the Nineveh Court gave the impression of a "marvellous peep-show, a contemporary toy theatre," and that the coloring seemed "garish to most people of refined taste." Jan Piggott assumes that the colors would have made Nineveh "absolutely ferocious."⁷³

⁷² Fergusson's published architectural reconstruction of the Assyrian palaces were deeply inspired by his awareness of the standing ruins of Persepolis: Fergusson 1851.

⁷³ Piggott 2004, 75–6, 112. Piggott (76) observed that Jones "had stamped his ideas and taste too heavily on the courts and observed a 'color fever', . . . 'polychromatic' runs like a motif, or even like a party line, throughout the company's guidebooks to the Courts." Cp. Anon. 1854b, 258 on the Egyptian casts: "Will anyone for a moment deny that the effect of the four vast seated colossi (in the Crystal Palace there are but two of these) which exist in the rock hewn façade of an ancient temple in Nubia, called by the Arabs Aboo-Simbel, must be infinitely grander in their native rock colour, mutilated as they are, then painted up into the hot and glowing monstrosities which they appear in the North Transept, where they sit glowering and roasting?" As one interesting side note in modern historiography, the painted plaster casts of the Parthenon Frieze in the Greek Court, by contrast, had to be removed due to negative public response, even though it was officially stated that the coloration was for experimental purposes (Hrvol Flores 2006, 93; Jones 1854; Piggott 2004, esp. 109–12). According to a contemporary news magazine "color was feared like the small-pocks" (Piggott 2004, 81). The "glaring" colors of the Nineveh Court were attacked by Samuel Sotheby, who pointed out that in Layard's descriptions the original colors of the excavated places would have been rather "delicate" and "occasional" (Piggott 2004, 87). William Rossetti is said to have "hated" the Nineveh Court and called it "an oppressive nightmare Life in death," finding the colors "hard, glaring and uncombined" (Piggott 2004, 111). The notion of the "theater" is significant: Frederick Bohrer has recently discussed the impact Layard's first discoveries had on the theatrical plays that were now able to adapt ancient decor on the stage (Bohrer 2003, 178–81). The stage decoration for "Sardanapalus, King of Assyria" (1853–4), opened at the Princess Theatre in June 1853 (Cole 1859; Krenzel-Strudthoff 1981), only one year before the Nineveh Court in Sydenham Palace and included a colorful imaginative palace of Sardanapalus and a view of Nineveh in the distance. It was performed sixty-one times in its first year, and an additional thirty-one performances in 1854 and made "Nineveh spring out of Mr. Layard's monumental book" (Bohrer 2003, 180). It was director Kean, who "einer altertumswissenschaftlich fundierten Ausstattung zu breiter Anerkennung und Weiterwirkung verholfen hat" (Krenzel-Strudthoff 1981, 3). Kean, born into an actor's

An anonymous reviewer in the *London Quarterly Review* in April 1855 noted scathingly

one shudders to think of the generations who groaned beneath the yoke of these sanguinary reds, implacable blacks, and cruel blues . . . There is only one class of visitors who will discover the slabs in the Nineveh Court to be really relieved at all, and that is the blind. Their sense of touch may ascertain the inequality of the surface; but those driven to trust to their eyes only in the examination of works of art will take these famous restorations for nothing more than a flat wall painted, and that not-precisely in a style calculated to atone for the sacrifice of the relief; for the same anti-Eastern gaudiness prevails here which characterises their gigantic neighbours. The remark of a neat little country maiden: These men look as if they'd got on clean white pinafores,' is about the highest praise that can be bestowed on them. . . . The more one contemplates this great eyesore of the Crystal Palace . . . the more we must wonder that any artists could be found to execute it. Want of time maybe justly pleaded . . . instead of too little time these gentlemen had infinitely too much, and, since taste could not stop them, it is pity want of pleasure did not.⁷⁴

Others praised the *educational* values of the installations.⁷⁵ Yet while the number of visitors in the Crystal Palace exponentially rose and the number of artists who used the sculpture galleries in the British Museum decreased dramatically between 1849 and 1870, the aesthetic debate focusing on “taste” overlaid discussion about how much was painted in the original reliefs. It is significant that judgments on the “taste” of the Assyrians soon followed. In 1854, Richard Westmacott wrote, referring to Assyrian monuments, that “for the further we go back to *barbarism* in art, or to the infancy of art, the more surely we meet with coloured sculpture.”⁷⁶

In a letter published a year later in May 1855, Fergusson countered that those who viewed the polychromy of Assyrian palaces as barbarous were simply revealing their own bleak sensibilities. Fergusson could

perfectly understand that a person accustomed to the grey atmosphere . . . or the smoky dinginess of London, [will find] such decorations too brilliant for their enfeebled nerves . . . If anyone likes to assert that the taste of the Assyrians was bad, and their art barbarous, that is a matter of opinion which I do not propose to discuss at present.⁷⁷

family and himself an Eton student and member of the society of antiquarians, was later even labeled “the greatest archaeologist of the day” (Krengel-Strudthoff 1981, 4). The sketches for the stage decorations and sets, designed by Grieve and executed by Gordon, Lloyds, and Days, are preserved today in the Victoria and Albert Museum and indicate that colors were used to paint the ancient Assyrian interiors.

⁷⁴ Anon. 1855, 163–4. ⁷⁵ Anon. 1854a, 246.

⁷⁶ Westmacott 1854, 28 [emphasis in original]. ⁷⁷ Fergusson 1855.

... MEANWHILE, BACK IN PARIS: THE FRENCH APPROACH

Across the Channel on the continent, engagement with aspects of ancient polychromies continued, too: Paris had already been the foremost European intellectual center of public discourses on polychromy relating to Egyptian, Greek, and Roman monuments. In 1822, Franz-Christian Gau (1790–1853) had exhibited a series of sketches of colorful ancient Egyptian façades at the Paris Salon. Gau was a close friend of Jacob Ignaz Hittorf (1792–1867), one of the most prominent defenders of ancient Greek sculptural polychromy, who had delivered a lecture at the Académie des Beaux-Arts in Paris in which he introduced his observations on ancient architectural polychromies in 1824. Hittorf published extensively on polychromy in the 1830s, and his monograph on a temple in Selinus in Sicily made him among the most prolific authorities in that matter on the European continent.⁷⁸

Victor Place, whom we had encountered previously and who continued to excavate in Khorsabad between 1852 and 1855, devoted a special chapter in his *Ninive et l'Assyrie* to the polychromy on the stone façades of the reliefs discovered there (**Figures 1.5 and 1.6**).⁷⁹ We have seen that Place, along with Botta, Flandin, and Layard, made frequent reference to remnants of paint on the Assyrian reliefs. Yet when it came to his subsequent presentations of the issue of polychromy he drew back from the trend to revel in colorful constructions. Place's personal aesthetic predilections may have been one reason for his “whitewashing” of the ancient palaces.

One of Place's comments on the subject of recent approaches toward repainting the past in London reveals his criticism that

the coloring of the bas-reliefs is a delicate issue, more relevant to pure decoration than construction. It is . . . important to know to what extent this practice was part of the Assyrians' customs, and whether or not they felt it necessary to enhance the intrinsic value of their sculptures by partially or totally coloring them. Several people, *in unnecessary attempts* to restore them, did not hesitate to apply color on the entire surface of the bas-reliefs, including the weapons, the clothes, the faces, the flesh, the beards and the hair. It seems to us that this is going way too far. There is no doubt that polychrome sculpture has been known since ancient times, and that the Assyrians did use such a natural method of depicting.⁸⁰

⁷⁸ Gau 1822; Hittorf 1830, 1846–51; cp. Hammer 1968; Kiene 2019; Kiene et al. 2016; Middleton 1982; Pisani 2003, 2021; Schneider 1977.

⁷⁹ Place 1867–70, vol. II: 82–4.

⁸⁰ “Le coloriage des bas-reliefs est une question délicate qui appartient à la décoration pure plutôt qu'à la construction. Il est donc important de savoir quelle part les Assyriens en ont tirée, et s'ils ont cru nécessaire d'ajouter au mérite intrinsèque de leurs sculptures le secours d'un coloriage général ou partiel. Plusieurs personnes, *dans la restauration plus ou moins justifiée*, n'ont pas hésité à étendre des couleurs sur toute la surface des bas-reliefs, armés, vêtements, figures, chair, barbe et chevelure. *Suivant nous, on est allé beaucoup trop loin dans cette voie*. Que la sculpture polychrome ait été connue dès les temps les plus anciens, et que les Assyriens aient pratiqué un procédé aussi naturel d'imitation, cela ne fait doute pour personne” (Place 1867–70, plates 20–1; trans. mine).



1.5. Hero holding a lion, from Dur Sharrukin, modern Khorsabad, Iraq, 721–705 BCE, alabaster, today in the Louvre, Paris, detail. Excavated by young Arab men under the direction of western “diplomats” in the mid-nineteenth century, the colossal stones were then transported and shipped to west Europe. Pauline Albenda, Astrid Nunn, Ariane Thomas and other scholars have summarized what we know about the polychromies of these early Mesopotamian stone sculptures. Photo: Fedor Selivanov, Alamy Stock Photo



1.6. Painted detail from a relief from Dur Sharrukin, modern Khorsabad, Iraq, 721–705 BCE, alabaster, today in the Louvre, Paris. Photo: Author

Was Place influenced by the Parisian environment in which discussion of the polychrome phenomenon was highly charged with aspects of orientalism? In retrospect, regarding the issue of polychromy on Neo-Assyrian palace reliefs, Place was following only along the lines of vagueness that had characterized Flandin's statements. In the plates accompanying Place's text volumes on *Ninive et l'Assyrie*, executed by Felix Thomas (1815–75), all stone sculptures on the front of the Gate of the Palace of Sargon at Khorsabad were depicted as white.⁸¹

Recently, David Batchelor has listed several nineteenth-century polemical writings in which “chromophobia” was evident, including the 1867 publication *Grammaire des arts du dessin* by the Parisian color theorist Charles Blanc (1813–82). According to Blanc color signified an “internal threat, an ever-present inner other which, if unleashed, would be the ruin of everything, the fall of culture.”⁸² Batchelor sought to identify a direct link between ancient philosophers and authors like Pliny to these nineteenth-century philosophical discourses on color. In Batchelor's words, already Pliny had placed color “at the wrong end of the opposition between the occidental and the oriental, the

⁸¹ Place 1867–70.

⁸² Batchelor 2000, 23.

Attic and the Asian, in a belief that the rational traditions of western culture were under threat from insidious non-western sensuality.”⁸³

Indeed, there is other evidence for a more modest take on constructing ancient polychromies in the 1860s. The Egyptian temple reconstructed by the then well-known Egyptologist Auguste Mariette (1821–81) for the 1867 World Exposition in Paris had a reduced polychromy, even though only fifteen years before the famous statue of an ancient Egyptian Scribe had been excavated in a tomb at Saqqara attesting once again to the vivid original polychromy of ancient Egyptian sculpture.⁸⁴

In “Chaldaeia and Assyria,” a volume in one of the more popular encyclopedias on ancient arts for the educated European, *Histoire de l’Art*, published in 1890 by George Perrot (1832–1914) and Charles Chipiez (1835–1901), the authors took their own stand on the issue of polychromy. They argued that in Egypt “hardly a square inch of surface can be found over which the painter has not drawn his brush, [while] elsewhere, in Greece for instance, we shall find him more discreet, and his artificial tints restricted to certain well-defined parts of a figure or building.” The question that arose for Perrot and Chipiez was whether the Assyrians were following the Egyptians or whether they would “strike a line of their own, and [would have] set an example of the reserve that was afterwards found favor in Greece.”⁸⁵ Their answer was clear in that

the Assyrian reliefs were coloured, but they were not coloured all over like those of Egypt; the grain of the stone did not disappear, from one end of the frieze to the other, under a layer of painted stucco. . . . The sculptor of Assyria was as ready to mix colour with his contours as his *confrère* of Egypt, but he made use of it in a more sober and reserved fashion.⁸⁶

In reviewing the debates of the second half of the nineteenth century, we can simply state that polychrome casts of ancient palace reliefs in public displays were an important feature and inspired discussion.⁸⁷ Few nineteenth-century polychrome casts of ancient palace reliefs are preserved today, such as those in the Museum für Vorderasiatische Kunst in Berlin (**Figure 1.7**).⁸⁸ It is interesting to note that the backgrounds of the reliefs are painted in green. Details such as the coats of winged demons come in alternating colors, and human skin is depicted in a reddish color. An Assyrian Room, which opened in 1865 in the

⁸³ Batchelor 2000, 29.

⁸⁴ Ziegler 2002. Nineteenth-century research on ancient Egyptian polychromy was then summarized in Bissing 1898.

⁸⁵ Perrot and Chipiez 1892, 244–5. For an updated view on the work of Perrot and Chipiez, see Briant 2019.

⁸⁶ Perrot and Chipiez 1892, 245, 249–50. ⁸⁷ E.g. Aldenhoven 1896; Kader 2004.

⁸⁸ Vorderasiatisches Museum, Berlin, VAG 19 and VAG 1072; plaster cast of original relief VA 962, ninth century BCE Northwest Palace at Kalhu/Nimrud; Rehm 2018, 141, 150, nos. 43, 85, and 424–5, figures 103–5.

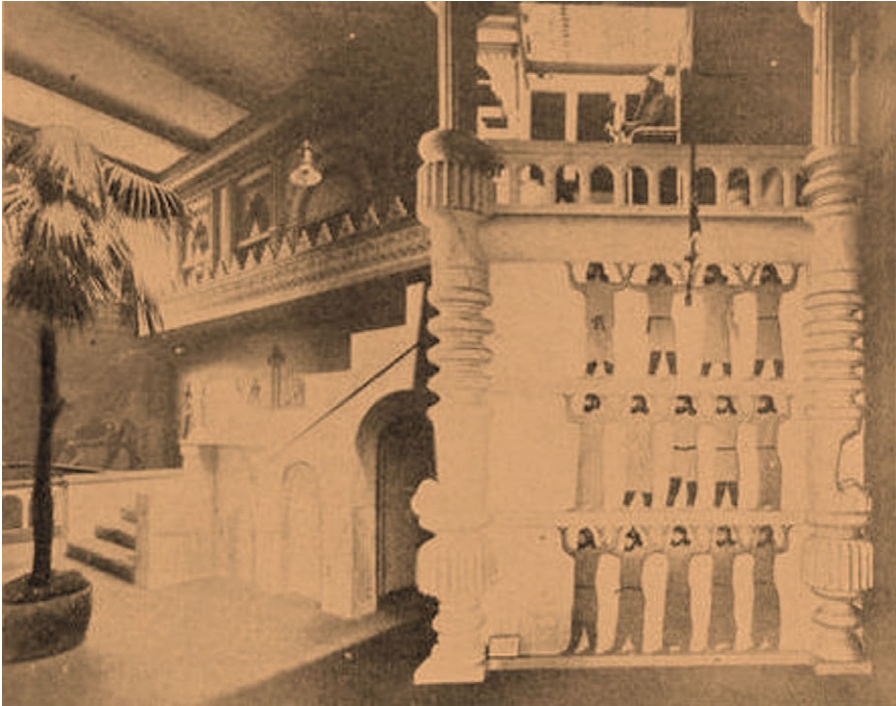


1.7. Painted plaster cast of an Assyrian stone slab (883–859), nineteenth century, Vorderasiatisches Museum, Berlin, VAG 19, artist unknown. The original slab from the ancient site of Nimrud in Mesopotamia is also housed in Berlin. Photo: Staatliche Museen zu Berlin, Vorderasiatisches Museum / Olaf M. Teßmer

Glyptothek in Munich, featured polychrome colossal cast Lamassus and painted scenes from Layard's publications alongside original seven original Nimrud northwest palace limestone slabs King Ludwig had acquired from London in 1863.⁸⁹ After the death of Leo von Klenze early in 1864, Georg von Dollmann (1830–95) oversaw the execution of the polychromy of the two lamassu statues in the Assyrian Room. Paul Wolters (1858–1936), who would later become director of the Glyptothek, described the installation as “arg missglueckt.”⁹⁰ Finally, a late nineteenth-century construction of polychrome plaster casts in Washington, DC should be mentioned. It featured entirely painted Lamassus and a partly painted plaster cast of a relief from the Hall of 100 Columns at Persepolis. This relief depicting a jamb of a door in the Hall of 100 Columns of

⁸⁹ Description of the Assyrian Room in the Glyptothek in Munich: Brunn 1887; Gaugengigl 1870; Gebhard et al. 2009, 440, figure 4; Rehm 2018, 229–31; Thiemann 2009, 14–9. I am grateful to Dr. Erwin Emmerling, chair of the Lehrstuhl für Restaurierung, Kunsttechnologie und Konservierungswissenschaft, Technische Universität München, for facilitating access to the important dissertation of Thiemann. Back then, the Glyptothek was already home to a painted miniature plaster version of the pediments of the temple of Aphaia at Aegina, c. 500 BCE, by the German architects Leo von Klenze (1784–1864) and Joseph Ohlmüller (1791–1839), to which a new version was added by Adolf Furtwängler (1853–1907) in the early twentieth century. Klenze himself passed away in January 1864 before the room was officially opened. The harsh criticism on the polychrome reconstruction of the Lamassu casts in Munich is still evident in Schwahn 1983, 200–1.

⁹⁰ Wolters 1921; Schwahn 1983, 201 uses the phrase “deutlicher Niveauabfall” (“noticeable lapse in standards”).



1.8. Installation of an imaginary throne of a Persian king in Washington, DC's Hall of the Ancients, c. 1900. This Xerxes near the White House is a rare example of an exciting creative engagement with the then excavated ruins at Persepolis or Takht-e Jamshid. Photo: National Galleries of History and Art

Persepolis became part of a throne installation on which a dummy depicted an imaginary Great King, Xerxes (**Figure 1.8**).⁹¹

Even though most of the painted plaster casts are no longer preserved, we can appreciate the palette and patterns of polychromy application from contemporary descriptions and pictorial documentation. It is important to stress, however, that these polychrome reconstructions were artistic creations in their own right. Their contribution to our understanding of the original polychrome palette of ancient environments is, therefore, perhaps rather limited. The fact that these casts were fully painted does, however, attest a belief in an overall polychrome treatment of the original monuments. It also allowed public interest in participating in the debate on the polychromy of ancient western Asian stone reliefs.

DEBATING ANCIENT POLYCHROMIES FROM WESTERN ASIA IN THE TWENTIETH CENTURY

The popularity of displaying painted plaster casts alongside original monuments in museums displaying originals from the sites decreased in the early

⁹¹ Smith 1897. Unfortunately, these casts were destroyed long before World War II.

twentieth century. The Nineveh Court in the Crystal Palace in Sydenham burned down in a fire in 1866 and was never rebuilt. Polychrome casts in the Assyrian Room in Munich and later in Berlin were taken off display in the early twentieth century. The Halls of the Ancients in Washington, DC went out of business. With few exceptions, newly found sculptures were rarely displayed in or alongside polychrome reconstructions.⁹² An early twentieth-century statement by the German scholar Botho Gräf (1857–1917) referring to the habit of displaying painted casts in general is indicative of understanding changing aesthetics: “A white plaster cast is honest, a painted one an illusive baublerly. Perhaps it would be a pleasant décor in a living room; in a museum it does not belong.”⁹³ As for a general dislike of polychrome in the built environment, the influential Irish artist James Ward (1851–1924) noted that the “people of our own countries have been so unaccustomed to coloured buildings for the last three or four hundred years that a strong prejudice against the use of colour in architecture has been developed and is maintained even at the present day.”⁹⁴

Throughout most of the twentieth century, there was little interest in synthetic, much less theoretical discussions about the extent of original polychromies on the ancient monuments of western Asia. In his monograph on Assyrian glazed objects, Walter Andrae (1875–1956) summarized for Assyrian art: “Taken individually, the colors are often so abundant and shimmering that it is impossible to observe them from a close distance without one’s eyes hurting. And yet, taken together, they are necessary and remain indispensable to the whole.”⁹⁵ Reliefs with traces of paint continued to be excavated in private houses at Assur alongside polychrome figurines, and all the evidence that Andrae discovered might have opened up the possibility of wide ranging studies about polychromy in ancient western Asia or specifically its place in the Neo-Assyrian environment.⁹⁶ Ironically, however, when Andrae designed a reconstruction of an Assyrian palace interior for the Vorderasiatisches Museum in Berlin, which opened in 1931, he rejected the incorporation of any of the

⁹² One rare exception is the original bust of Nefertiti, excavated in 1913 (Teeter 2012, 165, figure 35). A painted Nefertiti *model* was acquired by the Institute for the Study of Ancient Cultures Museum in Chicago in 1923. For comments related to the ban of mold making from the originals, see Kraus 1987–92; analysis of paints on the head of Nefertiti: Wiedemann and Bayer 1982.

⁹³ “Ein weißer Gipsabguss ist ehrlich, ein bemalter eine täuschende Spielerei, sie kann vielleicht erfreulich in der Ausstattung von Wohngemächern wirken, in ein Museum gehört sie nicht” (trans. mine). Extracted from a lecture, delivered in November 1907 in Jena, Germany, cited in Kader 2008, 235–6.

⁹⁴ Ward 1913, 5.

⁹⁵ Andrae 1923, 1: “Im einzelnen sind die Farben oft so übermäßig und flirrend, dass es unmöglich ist, sie ohne Augenglimmern aus der Nähe zu betrachten: Und doch: im Gesamtbild werden sie notwendig und unentbehrlich” (trans. mine).

⁹⁶ Andrae 1923, 15 and plate 10; figure 7; 27 and plate 30.

painted plaster casts of orthostat reliefs that had previously been on display in Berlin. Instead he installed original orthostat reliefs on the walls of this gallery and placed them against a deep red painted background. Plaster casts of winged Lamassu guardian figures from the British Museum completed this display but were left “white.”⁹⁷

One of the more influential twentieth-century scholars working on ancient architectural and sculptural polychromy, Patrik Reuterswärd (1886–1971), did not cover the region east of the Mediterranean in his work.⁹⁸ This is a significant index of dampening of interest in the context of polychromy in the ancient world broadly speaking at midcentury. In 1972, a conference was held on “The Realms of Colors,” designed to explore color in the literary traditions of major world civilizations.⁹⁹ The papers are valuable contributions to the study of color through literary texts, including one on conceptions of color and color symbolism in Homeric Greece, one on colors in Jewish tradition, and one on light and color in nineteenth-century Iran.¹⁰⁰ There were few exceptions: Benno Landsberger (1890–1968) published a landmark study on color terms in Sumerian and Akkadian in 1967. Anton Moortgat (1897–1977) and Eckhard Unger (1884–1966) summarized the evidence for wall paintings across pre-Achaemenid western Asia in 1959 and in the influential *Reallexikon der Assyriologie* (1971), while wall paintings continued to be found in excavations on sites along the Euphrates and the Tigris. In 1936, well-preserved wall painting fragments from a Neo-Assyrian Palace at Til Barsip in Syria were published, and pigments from the site were briefly discussed.¹⁰¹ Horses on the paintings led to the suggestion that Assyrian kings dyed their real horses blue, an interesting hypothesis not picked up, however, by later scholars.¹⁰² While Assyrian wall painting fragments were continuously being studied,¹⁰³ they were not discussed in the context with the paintings and colors noted on the carved stone monuments found nearby. This polychromatic aspect of three dimensional sculptures or bas reliefs, by contrast, was treated only marginally: Samuel Paley (1941–2010) commented on these issues in his publication on Neo-Assyrian palace art, and became a strong advocate of a total polychromy of the Assyrian reliefs.¹⁰⁴ As mentioned previously, Astrid Nunn also discussed the issue.¹⁰⁵ Notably, she extended her study to incorporate the Achaemenid period by citing observations on the polychromy of the reliefs at Persepolis that had been just recently published then by Giuseppe and

⁹⁷ Jakob-Rost 1992. ⁹⁸ Reuterswärd 1958, 1960. ⁹⁹ Portman and Ritsema 1974, vii.

¹⁰⁰ Corbin 1974; Rowe 1974; Scholem 1974.

¹⁰¹ Thureau-Dangin and Dunand 1936; cp. Abbate 1994; Granger 1933.

¹⁰² Reade 1979, 32. The tradition of blue painted horses in art continued in western Asia until much more recent times, see, e.g. Stanley 2021, 180 no. 138 (watercolor on paper).

¹⁰³ Albenda 2005; Tomabechi 1980, 1983a, 1983b. ¹⁰⁴ Paley 1976, 10–1.

¹⁰⁵ Nunn 1988, 229–34.

Ann Britt Tilia (see Chapter 4). Peter Roger S. Moorey (1937–2004) offered a brief analytical overview of the material evidence for polychromy on ancient western Asian relief sculpture making full use of the Persepolis material revealed by then. In addition, Moorey reviewed the state of research on pigment material sources and analysis available to him at the time.¹⁰⁶

A prolific student and advocate for the analysis of pigments from painted stone sculptures of premodern times was Rutherford John Gettens (1900–74). With his study of the evidence from Buddha statues in Afghanistan he offered an important model and recognized the importance of the conservation of the materials and pigment analysis early on.¹⁰⁷ Gettens was particularly influential in the formation of the first collections of pigment samples in western museums. Altogether, however, discussion on whether the monuments were partially or entirely painted remained vague.¹⁰⁸ The few discussions on Achaemenid Persian polychromy introduced here remained therefore largely isolated.

In sharp contrast to this situation for the regions of western Asia, the twentieth century saw great progress in the investigation of aspects of ancient Egyptian polychromy, painting techniques, color, and color symbolism. In his landmark study *Ancient Egyptian Materials and Industries*, Alfred Lucas (1867–1945) laid the groundwork for a technically advanced investigation of ancient Egyptian painting materials.¹⁰⁹ Between 1980 and 1991, the Egyptian–German multidisciplinary collaboration project “Zusammensetzung altägyptischer Farbpigmente und ihre Herkunftslagerstätten in Zeit und Raum” set new standards in a more systematic study of ancient Egyptian pigments and colorization, which is unsurpassed today.¹¹⁰ Major conferences on pigments, paints, and polychromies in ancient Egyptian culture have been held in the last two decades in Europe and in the United Kingdom, in 1996 and 1998.¹¹¹ Research into pigment production in Egypt is particularly relevant for the Achaemenid Persian Empire, too, especially as it relates to pigments excavated on the site of Elephantine, a Persian colony of major importance.¹¹²

¹⁰⁶ Moorey 1994, 79–105, 326. ¹⁰⁷ Gettens 1937–8.

¹⁰⁸ E.g. for polychromy on monumental stone sculptures from Nimrud: Stearns 1961, 20 n. 40 with references; Reade 1979, 18; Reade 1983, 29–30, figures 22, 24.

¹⁰⁹ Lucas 1926, 4th ed. 1962. The standard handbook has now been superseded with a volume edited by Nicholson and Shaw 2000. See here, especially the chapter “Painting Materials” (Lee and Quirke 2000). Important works on paints, pigment, and color symbolism in ancient Egyptian art include Aufrère 1991; Baines 1985; Barbotin 2014; Colinart and Pagès-Camagna 2001; Davies 2001; El-Leithy et al. 2019; Forbes 1965; Jacksch 1985; Kees 1943; Lauer 1993; Pagès-Camagna and Raue 2016; Schenkel 1963; Tanre 2008.

¹¹⁰ Blom-Böer 1994: Some 1,400 samples from 145 monuments from the mid-third millennium to c. 96 CE were analyzed; see, now, Blom-Böer 2020.

¹¹¹ Colinart and Menu 1998; Davies 2001; Tefnin 1997.

¹¹² Pagès-Camagna and Raue 2016.

All these publications, and an increasing demand for detailed investigations, have contributed to a greater awareness among all experts involved. The two comprehensive works by Moorey, *Materials and Manufacture in Ancient Mesopotamia: The Evidence of Art and Archaeology* (1985) and *Ancient Mesopotamian Materials and Industries: The Archaeological Evidence* (1994) can be seen as the equivalent of Lucas' (1926) *Ancient Egyptian Materials and Industries* in the field.

Scholars made a similar process to understand better the extents as well as the process of polychromy in wider ancient Mediterranean art. Since 1982 Volkmar von Graeve, followed by Vinzenz Brinkmann and an interdisciplinary team, has worked together with the Doerner-Institut in Munich, supported by the Deutsche Forschungsgemeinschaft, to investigate aspects of ancient Greek polychromy.¹¹³ In France, Denmark, Italy, and Greece projects focusing entirely on polychromies have been initiated by Hariclia Brekoulaki, Brigitte Bourgeois, Philippe Jockey, Clarissa Blume, Agnes Rouveret, Jan Stubbe Østergaard, Paolo Liverani, and Ioanna Kakoulli, respectively.¹¹⁴

It is only very recently that a new wave of systematic analysis of polychromies in any ancient western Asiatic contexts has been undertaken and the impetus has come mainly from conservation scientists and field archaeologists.¹¹⁵ Positions on the extent of polychromy on the surface of ancient stone monuments remain, however, mainly unchallenged. It seems we have not made much progress from the days of Layard. A recent statement is symptomatic of the attitude: "Although little paint survives today, some figures *may* have been completely colored or, possibly more generally, paint was used for special effect."¹¹⁶ It should therefore not come as a surprise that nearly all movies set in ancient interiors, imaginative as they are, continue to favor almost exclusively monochrome monuments in the background. Early examples include scenes in *Intolerance* (D. W. Griffith, 1916), *Alexander the Great* (R. Rossen, 1955) and *Solomon and Sheba* (K. Vidor, 1959). More recent examples are the groups of monuments reconstructed in the triumphal procession of Alexander in Babylon in *Alexander* (O. Stone, 2004) or the 2021 *Eternals* movie directed by Chloé Zhao.¹¹⁷

¹¹³ E.g. Brinkmann 2003; Brinkmann et al. 2017.

¹¹⁴ E.g. Becker 2020; Blume 2015; Blume-Jung 2020, 2021; Bourgeois et al. 2007; Brekoulaki 2000, 2006a, 2006b; Jockey and Bourgeois 2001, 2003, 2005a, 2005b, 2005c; Kakoulli 2009; Liverani 2005; Liverani and Santamaria 2014; Monteix 2012; Rouveret and Walter 1998; Rouveret et al. 2006; Stubbe Østergaard and Nielsen 2014 (for a combination of research and mining ancient textual traditions and materials).

¹¹⁵ E.g. Bollati 2008; Gebhard et al. 2009; Karmous et al. 2006; Kidd et al. 2004; Lippolis 2009; Paley and Hendrix 2008; Shaer 2003.

¹¹⁶ Collins 2008, 27, emphasis mine.

¹¹⁷ The British classicist Robin Lane Fox was the consultant for *Alexander* (Cartledge and Rose Greenland 2010).

Today, scholars on aspects of ancient polychromy are well aware of how fruitful it can be to apply a combination of methods from various scientific fields and disciplines. Systematic investigations into the extent and role of polychromy of ancient monuments with combined multidisciplinary approaches have been developed. Initiatives from neighboring disciplines can assist in the process and show that progress can be made if collaboration takes place. Foremost are studies on how to reconstruct certain aspects of polychromy in Greek, Roman, and Egyptian art, where scholars are often able to build upon an earlier tradition of comprehensive studies.¹¹⁸ The International Committee of Museums and the International Committee for Conservation have collaborated on a series of conferences highlighting recent research on architectural and sculptural polychromy.¹¹⁹

In conclusion we might state that since the arrival of the first ancient monuments in European museums, scholars have only occasionally dealt with the matter of the original polychromatic treatment of the palace reliefs. The situation stands in sharp contrast to research conducted on ancient Egyptian, Greek, and Roman sculpture. Because of nineteenth-century polychrome reconstructions, however, the layperson was able to consider aspects of and at least better informed about ancient polychromies than we are today. The early displays of polychrome ensembles in London, Munich, Berlin, and Washington, DC, provided popular settings in which discussion would have been provoked. The brightly painted casts of those days were excellent examples of the public education that nearly all contemporary museum displays fail to offer as a means of educating the public about ancient polychromy. In that sense, the nineteenth century can therefore be seen as an enlightened era. While this mission of public education was laudable, an appreciation of the polychromies of ancient monuments competed with the imperatives of preserving and documenting the accuracy of the presentation of the material record. Examples like the ones introduced serve as reminders that histories of color are only as firm as the available evidence, which can change dramatically with new finds and new technologies applied in the determination of pigments and surface coatings.

¹¹⁸ The French industrial chemist Jean Antoine Chaptal (1756–1832) already performed chemical tests on pigment samples found at Pompeii: Caley 1946; Chaptal 1809; Wallace 1927; Important works on polychromies on ancient stone (and in some cases, modern receptions) include Abbe 2015; Aggelakopoulou and Bakolas 2022; Aliatis et al. 2009, 2010; Augusti 1967; Béarat et al. 1997; Bracci et al. 2015; Bradley 2009; Brinkmann and Wünsche 2004, 2007; Cleland and Stears 2004; Dimitriou 1951; Fridell Anter 2006, 2008; Grimaldi 2021; Hendrix 2000; Jockey 2007, 2018; Jockey et al. 2009; Kargere 2012; Knuutinen et al. 2007; Kottaridi 2006; Liverani and Santamaria 2014; Mercier and Sanyova 2012; Mulliez 2019; Posamentir 2006; Rees-Jones 1990; Şare Ağtürk 2021; Siotto 2017; Skovmøller 2020; Stager 2022; Tiverios 2002; Villard 2002; Yvantidis 1984; Zink and Piening 2009.

¹¹⁹ Litjens and Seymour 2017.

WHAT REMAINS: PRESERVING THE PAINTS OF ANCIENT PALACE FAÇADES

It is impossible to write a historiography of modern polychromy research on ancient architectural reliefs in the last two centuries without referring to efforts that were undertaken to *preserve* the remaining traces of paint on the monuments. While much has been written about the development of the field of conservation in the nineteenth century, these writings are, with few exceptions, less concerned with the treatment of the fragments that were extracted from the earths of western Asia.¹²⁰

When de Longpérier documented traces of paint on the reliefs from Khorsabad in the Louvre in February 1847, he noted their fragility. His colleague in London, British Museum curator Edward Hawkins (1780–1867), commented on the fragility of the surface of the stone reliefs. Yet it is known that molds for the creation of casts were allowed to have been made before 1849.¹²¹ Furthermore, it is reported that Layard, who would have had the best opportunity to document the surface of the monuments at the moment of their recovery in the field, *whitewashed* panels on the site so that he could draw them better.¹²² Adding to the endangerment of evidence, two stone bulls excavated at Khorsabad, acquired by the British Museum in 1851, had to be “left outside, partially exposed to the weather under the Museum colonnade,” owing to the lack of space, before they found their new home in the British Museum.¹²³

With increasing requests for casts, the curators in Paris and London often faced similar problems. De Longpérier became increasingly concerned about the fragility of the surface of the originals and refused to have moldings made for commercial purposes.¹²⁴ Although a cast workshop had existed in the Louvre since the early nineteenth century, it was only in the 1850s that activities increased. In May 1851, de Longpérier contacted the chemist Jules Reiset (1818–96) to learn whether the process of molding would harm the surface of the originals.¹²⁵ After receiving Reiset’s answer, de Longpérier became even more hesitant to embark on new mold-making experiments.¹²⁶ That these concerns remained only episodic is evident, however, from the correspondence preserved between London and Paris concerning the production of casts from molds for exchange. Official requests for taking molds of original monuments in order to duplicate and paint them were made in subsequent years by the “Crystal Palace Company,” represented by the very same James Fergusson who had claimed that at least in Paris the making of

¹²⁰ Brajer 2013; Burnett Grossman et al. 2003; Conti 2007.

¹²¹ Reade 2008, 14.

¹²² Reade 2000, 614 n. 42. ¹²³ Jenkins 1992, 158.

¹²⁴ Letter, November 8, 1850: Rionnet 1996, 45 n. 19.

¹²⁵ Rionnet 1996, 40, 45 n.17; letter from May 10, 1851.

¹²⁶ Rionnet 1996, 47.

molds had done no harm to the originals in the past, as well as foreign institutions such as the Prussian government in Berlin.¹²⁷ Hawkins continued to be hesitant to allow new molds being made for reasons of the sculptures' fragility.¹²⁸ On December 10, 1853, the Trustees of the British Museum, however, agreed to allow more molds to be made but required that they be protected with tin foil wherever color appeared.¹²⁹

In the meantime, the requests for casts for the Crystal Palace in Sydenham led to further mold-making from original reliefs in Paris in 1853 by Pierre-Laurent Micheli, director of the Louvre's *Atelier de Moulages*.¹³⁰ In 1855, casts of all Nimrud sculptures then in the British Museum became available for sale.¹³¹ However, a few months before (on August 18, 1853), Layard filed complaints against the authorities in the British Museum, inquiring regarding the "cleaning" of an Assyrian head in the galleries.¹³² Jonah Siegel has recently collected some primary sources on a debate about the display and the cleaning of the Nineveh reliefs that took place in 1857. Here are excerpts from the discussion and the answers given by Hawkins in a public hearing:

- Q. "Have the alabaster slabs in the Assyrian Room undergone any change?"
 A. "They are getting dirty of course, but I am not aware that they are damaged in any other respect. The material is such that any application of water must necessarily injure them."
 Q. "What means are taking for cleaning them?"
 A. "They have never been otherwise cleaned than merely being dusted with a feather, or something of that kind, they are not allowed to be touched with anything hard. We touch them as little as possible."¹³³

¹²⁷ Letter from August 8, 1853: Reade 2008, 14.

¹²⁸ Reade 2008, 14 referring to a letter of Hawkins, December 7, 1853. ¹²⁹ Ibid.

¹³⁰ In November 1853 a set of casts was made of the Khorsabad bulls (AO 19857 and AO 19858; Rionnet 1996, 121 n. 13–4), the winged genius (Rionnet 1996, 122 n. 16), and others (Rionnet 1996, 121–2). Also, from monuments from Nimrud and Nineveh casts were made (124–5). The British criticized the molds for their imperfection (Rionnet 1996, 129; letter, November 14, 1854), but the Louvre refused to produce new molds (Rionnet 1996, 21 n. 35). In exchange for the casts that were allowed to be taken earlier, Lottin de Laval was allowed to make casts of the British Museum Nimrud monuments. The casts were obviously displayed along the originals in the Louvre, joined by another cast of a bull, executed in 1856 by Maximilien Pellegrino Togneri, although they are not mentioned in the contemporary guidebooks. The cast collection of the Louvre was, in fact, kept in the neighboring rooms to the Assyrian rooms. From the new acquisitions from Place's excavations at Khorsabad, a new series of monumental sculpture arrived in Paris in 1856 (AO 19859), and new casts were molded and available for sale by 1864 (Rionnet 1996, 121, catalog no. 12).

¹³¹ Reade 2008, 15. ¹³² Ibid.

¹³³ Siegel 2008. On the harm of past cleanings of Neo-Assyrian reliefs in museums now see also Thavapalan 2019b, chapter 4, and Thavapalan et al. 2016.

To conclude, little has been written about aspects of cleaning of ancient stone sculpture on the sites and in European museums in the nineteenth century. We may infer, however, that personal dislikes figure between museum curators and those who were considered experts on material and deterioration continued to be played out against the background of ancient sculpture.¹³⁴

¹³⁴ Indicated by Jenkins 2001, esp. 4–6; Oddy 2002. Modern treatment of ancient sculpture is also reported for the sculpted panels of the Amazon frieze from the Mausoleum of Halicarnassus, which, when removed originally in 1845, “were covered with thick whitewash which preserved them” (Jenkins et al. 1997, 37). Fragments of stone from the Mausoleum were found with abundant traces of paints (Cook et al. 2005, 30; Jenkins 2006, 39, figures 20–2 and 218; Jenkins et al. 1997, 38; Jeppesen and Luttrell 1986, 207).



2.1. Charles Texier's chromolithographic reconstruction of a door jamb relief from Persepolis, published in Paris in 1852, ten years after he visited the site. Texier 1852: plate CXI ter. Public domain

CHAPTER TWO

HISTORIOGRAPHICAL OVERVIEW, PART I: APPROACHING ACHAEMENID PERSIAN POLYCHROMIES IN THE NINETEENTH CENTURY – ANCIENT LITERARY TESTIMONY AND MODERN DISCOURSES

What happened during all these decades on the sites of Persepolis and Susa in Fars and Khuzestan, and their larger imperial context? Very much like their neighbors in Mesopotamia, they have much to offer in a fresh perspective on the recovery of polychromy and on the competing factors and tensions between presentation and preservation since the nineteenth century. The objective of the next chapters is to offer an historical, historiographical, and largely documentary overview of evidence for polychromies at the imperial centers of the Achaemenid Persian world within the context of debates around ancient polychromies as introduced in Chapter 1. I will present relevant information from ancient sources and then proceed first to the testimony of early modern travelers. This survey will be followed by an introduction of nineteenth-century antiquarians' and excavators' comments on the original polychromy. The documentary evidence collected here is critical to a fuller appreciation of the original reemerging polychromies of the Achaemenid Persian palatial environment. It also provides additional thoughts and reveals the significance of perceptions (1) of the polychromy of ancient palace architecture in general, and (2) of the polychromy of ancient Persia within the larger general discourse on the historiography of the archaeology of Achaemenid imperial sites. Heretofore, with few exceptions the importance of polychromy in that discourse has remained largely hidden.

ENTER: PERSEPOLIS IN CONTEXT

The history of the Achaemenid Persian Empire between c. 550 and 330 BCE is inextricably linked to the vast heartland of the present-day southwestern Iranian province of Fars, particularly to an area in northwestern Fars.¹ As the oldest capital of the empire established by Cyrus II in the mid-sixth century BCE, Pasargadae (Elamite *Batrakataš*, also *Bašrakada*) ceded its political and economic status to Persepolis. Pasargadae did, however, still figure very prominently among the sites in the Fars administration network at the close of the sixth century seen in the Persepolis Fortification tablets, as a site where specific religious activities occurred. A massive citadel complex, the Tol-e Takht, the tomb of Cyrus II, and a great number of construction and building activities as well as evidence for settlements and cemeteries around the region are evidence for continued occupation.²

The recent rediscovery of the remains of an impressive monumental gate some 3 km west of Persepolis links the activities of Cyrus II and his successors in Babylon to Persepolis proper.³ The site of Anšan (modern Tall-e Malyan), some 45 km northwest of Persepolis, long home to an important Elamite dynasty, seems to have been largely abandoned around 1000 BCE. But it held iconic status as a locus of Persia.⁴

The Achaemenid Persian Empire consisted of a “multi-capital system.”⁵ On the whole, we must assume the empire as an “état itinérant,”⁶ in which the royal entourage traveled between a number of sites with impressive royal camps, in a large and well-organized system, over vast distances. As the tablets from Persepolis attest, bureaucracy worked, on a local and a regional level. Modern scholars agree that the epigraphic evidence available suggests that each of the Achaemenid royal residences, Persepolis, Susa, Ecbatana (modern Hamadan), and Babylon had administered its own hinterland with satellite villages and hamlets. The territory of the administration of Persepolis covered the largest part of present-day Fars, an area of hundreds of kilometers⁷, while Susa, where we lack similar rich epigraphic evidence, may have administered most places in the Susiana plain in Khuzestan. As recent research has shown, life at Susa, the millennia-old capital of the Elamite Empire, was probably very much intermingled with life at the wider Persepolis area. A network of settlements linking both capitals existed, and there is considerable evidence

¹ Boucharlat 2021; Briant 2002; Henkelman 2013, 2021; Jacobs 2021a; Kuhrt 2007; Mousavi and Daryaei 2021. On aspects of a modern history and the role of archaeology in Iran, now, Daryaei 2012; Matthews and Fazeli 2022; Potts 2013.

² Gondet et al. 2021; Henkelman 2008, 118, 390; Mozaffari 2014.

³ Askari Chaverdi et al. 2014; Askari Chaverdi and Callieri 2015, 2017a, 2017b. Askari Chaverdi et al. 2017; Basello 2017.

⁴ Alvarez-Mon et al. 2018; Potts 1999, 285; Sumner 1976. ⁵ Boucharlat 2001, 114.

⁶ Briant 1988. ⁷ See now, however: Henkelman 2008, 110; 2017a.

of the exchange of craftsmen and commodities.⁸ In the estimation of ancient travelers' accounts it took some thirty-five days for a journey between Persepolis and Susa, some 500 km apart.⁹ The modern Mārūn River, the ancient name of which is not known, has been identified as the natural border between the administrative areas of Persepolis and Susa.

The greater Persepolis area was therefore only one of many rings of power bases in the vast empire. All of these core sites had long-standing pre-Achaemenid traditions of polychromy in the form of, for example, glazed bricks (Babylon, Borsippa, Susa, Qalaichi), painted tiles, wall paintings, textiles, and painted sculptures.¹⁰ These long-standing traditions are part of the legacy to which the Achaemenids were heir when they established themselves in southwestern Iran.

Located some 40 km north of modern Shiraz, the remains of Persepolis or Parsa on the platform of Takht-e Jamshid ("Throne of Jamshid") are visible on the eastern edge of the plain of Marv Dasht at the foot of the Mountain of Mercy, the Kuh-e-Rahmat.¹¹ Additional palatial structures, only partially excavated, and their extent still imperfectly known, appear immediately below the Takht and in near distance.

Persepolis proper was part of a larger ecological environment that is defined in part by the Sivand River, further north of the platform. The Sivand River connects the royal residence at Persepolis to the royal necropolis of Naqsh-e Rostam with the rock-cut tombs of the Achaemenid ruler Darius I (522–486 BCE) and his successors, wends its way along Istakhr and other settlements in this fertile plain and continues onto the imperial site of Pasargadae in the north.¹² Within the wider region, the Persepolis Fortification Tablets archive lists sites including Matezziš and Tirazziš (modern Shiraz). It also includes areas further west such as the recently explored Mamasani plain between Persepolis and Susa.¹³ There is evidence that travel to and from Persepolis peaked during the annual Persian New Year festival.¹⁴

⁸ Basello 2018; Briant 2013; Garrison 2011; Henkelman 2008, 346 with further references; Kleiss 1981; Koch 1986; Potts, Askari Chaverdi, et al. 2009; Potts, Roustaei, et al. 2009.

⁹ Henkelman 2008, 114; Susa: Perrot 2013.

¹⁰ Painted tiles in Median Baba-Jan in the Ecbatana area: e.g. Goff 1977; wall paintings at Anšan: Nickerson 1977; Elam: Alvarez-Mon 2005, 2021; Alvarez-Mon et al. 2018; Spycket 1981; Qalaichi: Abdali 2018; Binandeh et al. 2017; Hassanzadeh and Curtis 2021.

¹¹ Mousavi 2012. The ancient names of the site attested in inscriptions are Old Persian: Parša (Kent 1953, 196), Elamite: Ba-ir-sa-(an/is) (Hallock 1969, 87).

¹² The best overview on the excavations and iconography of the Naqsh-e Rostam complex can now be found in Garrison 2017, 387–415. For a precise overview of the geography see also Adachi 2008; Aminpur 2006; Gondet 2011, 2015. On the role of relief carving in the environment throughout ancient times: Canepa 2021.

¹³ Potts, Askari Chaverdi, et al. 2009; Potts, Roustaei, et al. 2009. ¹⁴ King 2022.

The Greek historian Diodorus, writing in the first century BCE in the social and political context of Augustan Rome, has left us a vivid description of the general layout of Persepolis. It is our *only* ancient literary description, and although not detailed on specific buildings and monuments, it helps us to envision the site that Alexander of Macedon encountered during his invasion in the winter of 331 BCE. Diodorus' account describes how the private dwellings in the plain were "furnished with every sort of wealth over the years . . . abundantly supplied with furniture and wearing apparel of every kind," and how the owners of these houses had much silver and gold and "dresses gay with sea purple or gold embroidery" (Diodorus, 17.70.2–4, trans. Bradford Welles). Assuming the order of his description is correct, this information refers to the dwellings in the plain below the terrace. Diodorus then continues with a brief description of the Takht itself, which was surrounded by three fortification walls (17.71.4–5), before describing the tomb complexes and the circumstances of the fire set by Alexander.

The ruins atop the lofty Takht have from antiquity to the present been an evocative symbol of Iranian cultural heritage: a dramatic reminder of the Achaemenid dynasty, leaders of a powerful empire that ruled vast territories across Central Asia, Asia Minor, the Levant, and North Africa between the sixth and the late fourth centuries BCE. There is grandeur to the architecture and planning here. Persepolis well merits its distinction as one of the world's great monuments to humankind's past. The site has been on the UNESCO World Heritage list since 1979. Paradoxically, its destruction by Alexander in 331/30 BCE left much of the Takht architecture partially standing in its state of glory. Building activities continued under the Seleucid successors and later.

The ruins have always attracted visitors. These visitors have left valuable comments and records about the site as they witnessed it.¹⁵ Many of them also collected material from the site, some illegally. This fact combined with the partage protocols in place for a series of better documented interventions on the site between 1931 and 1939 has meant that any study of the polychromy of the monuments on the site and the materials must take place not only in Iran but also in museums and collections around the world.¹⁶

Today, Persepolis can be broadly divided into three separate areas, the terrace platform, some 450 m by 300 m wide, with the remains of at least fourteen buildings¹⁷; the adjacent hill with tombs that once contained the remains of two Achaemenid rulers and their families; and the monuments from

¹⁵ See the contributions in Mousavi 2002, 2012; Sancisi-Weerdenburg and Drijvers 1991. Photographic documentation: Vuurman 2015.

¹⁶ Allen 2009, 2013, 2016; Nagel 2010, 236–51, 2020, 2021c.

¹⁷ Buildings on the platform are referred to in inscriptions as *halmaraš* (DPf), with the individual palaces more specifically referred to as *tačara*, suite of rooms (Dsd), and *hadiš* (DSj), "seat of power" (Brosius 2007, 25; now Tuplin 2021). The Apadana, the Palace of Darius, and the

the ensembles excavated immediately adjacent below the platform.¹⁸ Recent survey work has supported Diodorus' description in revealing that access to the Takht was indeed possible only after passing a series of protective walls and watchtowers.¹⁹ At least one impressively decorated monumental gate has been identified in recent years at the site of Tol-e Ajori.²⁰

According to the epigraphic sources available, all Achaemenid buildings on the platform were constructed between c. 520 BCE and the late fourth century.²¹ Alexander's destruction of the monuments on the platform in 331/30 BCE has long been considered an important *terminus ante quem* for any investigations of the historic fate of the site.²² Recent decades' archaeological fieldwork explored plenty of post-Achaemenid activities around the site. There is evidence for traces of many fires, not least on the surface of the stone monuments itself, but also for rearrangement and reuse of stone material and buildings after Alexander's visit. Decay of the site occurred over time.²³ Questions remain open for a building located on the southwest corner of the Takht. This building, so-called Palace H, with its elaborate carved reliefs, was by the excavators believed to have been erected "sometime after the destruction of Persepolis (though certainly prior to the Islamic era)."²⁴ Here, aspects of stratigraphy are especially important. If Palace H was erected only after the 330s BCE, were the stone reliefs on the façades painted or repainted then, too?

Central Building (Tripylon) – the ancient names of which are unknown to us and have been subject to heated debates – were elevated on individual stone platforms. Modern scholars have suggested various theories about the date of specific buildings on the site (Koch 2001; Lentz and Schlosser 1968, 1971; Trümpelmann 1983, 1988). Even though the function of many buildings is not clear, and functions may have changed over time, there is mutual consent about a chronological sequence of most of the buildings on the platform. The buildings preserved are independent structures and, though often investigated as an ensemble, have to be treated like individual monuments with independent life stories. See also Razmjou 2010.

¹⁸ Roaf 2004, 396. It is generally agreed that the Achaemenid court spent a short time each year at the site, probably in the fall (Henkelman 2008, 7; but see Briant 2002, 910; Giovinazzo 1994; Tuplin 1998). When the court resided here, the royal machinery would have linked up with the local administration and drawn on regional resources. At these times, large sacrificial feasts (*šip*), intimately connected with the court, were held at Persepolis (Henkelman 2008, 5–8). A group of texts from Persepolis deals with festivals and animal sacrifices for Auramazdā, Humban, Mišdušiš, Pirdakamiya, and "the remaining gods." Ansi and šip festivals in which the local governors Parnakka and Ziššawiš were involved are mentioned (Henkelman 2008).

¹⁹ Aminzadeh and Samani 2006. See, however, the important observations by Boucharlat 2020.

²⁰ See footnote 3. ²¹ Godard 1952; Krefter 1971; Schmidt 1953.

²² Balcer 1978; Bloedow and Loube 1997; Hammond 1992; Sancisi-Weerdenburg 1993.

²³ E.g. Callieri 2003; Calmeyer 1990; Müseler 2005–6.; Tilia 1977, 74–6; Tilia 1978, 258, 315; Wiesehöfer 1994, 68, 7.

²⁴ Schmidt 1953, 279. See also Mousavi 2002; Tilia 1972, 253.

ANCIENT LITERARY TESTIMONY FOR POLYCHROMIES AT PERSEPOLIS AND IN THE ACHAEMENID WORLD

Although the palaces in the Achaemenid Persian heartlands were colorful throughout, there is surprisingly little classical testimony that talks about color in relation to Achaemenid imperial-built environments. Authors closer to the west took notice of an importance of colors in the eastern world, but are often unspecific: the multicolored rings of fortifications at Ecbatana, the old capital of the Median Empire, are described by Herodotus in some detail and may serve as a good reminder that color was, however, too important to escape notice:

The battlements of the first circle [of walls] are white, of the second black, of the third circle purple, of the fourth blue, and of the fifth orange: thus the battlements of five circles are painted with colours; and the battlements of the last two circles are coated, these with silver and those with gold. (Hdt. *History* 1.98, trans. Godley 1975)

From a late source we are informed about the rich ornamentation of the palaces at Ecbatana. The Greek historian Polybius (10.27) states, that the woodwork in the palace

was all of cedar and cypress, but no part of it was left exposed. The rafters, the compartments of the ceiling, and the columns in the porticoes and colonnades were plated with either silver or gold, and all the tiles were silver. (trans. Paton)

The situation described by Polybius is remarkably consistent with descriptions of seventeenth-century Isfahan. Today, palaces like Chehel Sotoun preserve remains of plates and covers on their original woodwork from the early years. There is a history of silver and gold plates applied to Islamic architecture, and fragments of such metal plates that originally adorned architectural surfaces have been excavated at Persepolis. Ancient sources, however rhetorical they are, refer to the Persian queen living in “a golden-doored palace.”²⁵

Literary sources present us with information, complex in their own ways, about mural painting and gold in the Achaemenid court environments. Herodotus claims to have seen a mural painting commissioned by Darius’ engineers depicting the bridge built by Darius I across the Bosphorus showing “the whole bridge, with King Darius sitting in a seat of honor, and his army engaged in passage” (Hdt. *History* 4.88, trans. Godley 1975). Much later, Athenaios (*Deipn.* 12.575), referring to the fourth-century BCE author, Chares of Mytilene, comments on “replicas of paintings of a famous myth of a Median princess and an Iranian ruler that can be found in temples and

²⁵ Aischylos, *Persians* 159; cp. Briant 2002, 205–8, 912; Hall 1989, 80–1.

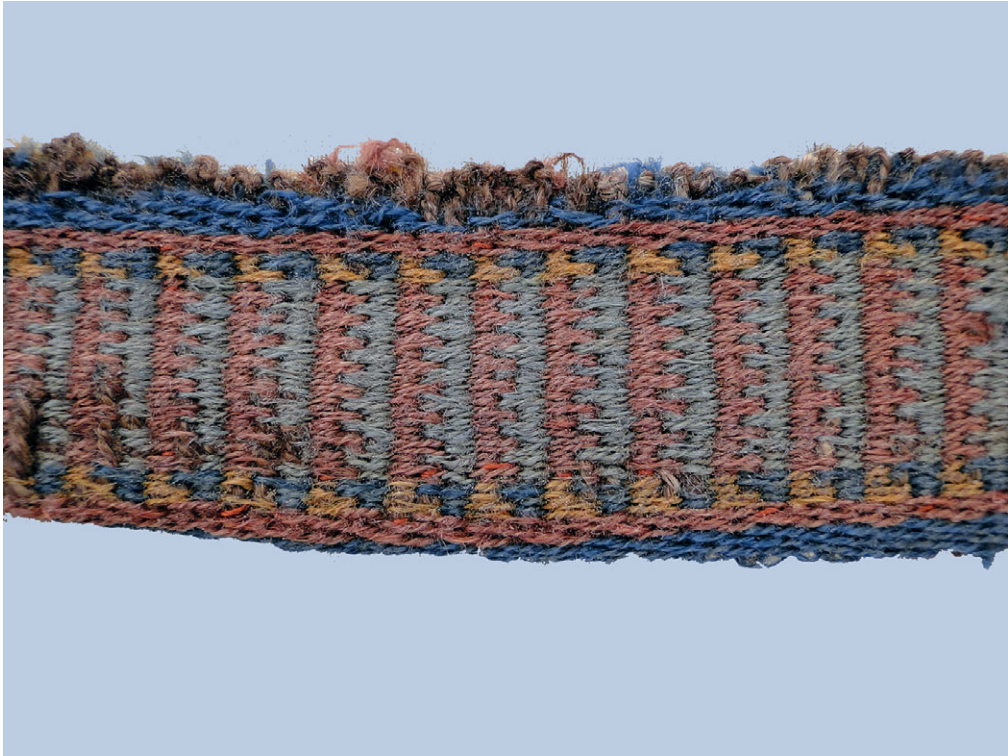
palaces, even in private dwellings” (trans. Gulick) of the non-Greeks inhabiting the empire.

Beyond these comments, the essential omission of references to polychromy on Achaemenid Persian monuments in the preserved literary sources is an indication of a general silence (disinterest?) in colors in the architectural and sculptural display that we get from most of the western authors for monuments in the ancient Mediterranean, too. If classical or Biblical texts refer to color it is almost exclusively related to textiles. According to the Bible (Esther 1.6), for instance, the king at Susa held a feast in the court of the garden of the royal palace, which was filled with “white, green, and blue hangings, fastened with cords of fine linen and purple to silver rings and pillars of marble; the beds (couches) were of gold and silver upon a pavement of red and blue, and of white and black marble.” Plutarch states that Alexander found at Susa some 5,000 talents of *porphyra hermionike*, “purple from Hermione,” which had been stored for 190 years and “was still fresh in color” (Plutarch, *Alexander* 36.36 trans. Perrin; see Chapter 5 for further implications of this text). For Persepolis, we have the reference by Diodorus, mentioned previously. Only in recent years, with the discovery of actual textile specimen in the Zagros, our idea of these rich textile polychromies grows. With its blue, yellow, red, and light blue warps, the woolen belt of a young man (“Saltman 3”), which was excavated in 2004, sheds light on aspects of polychrome textile production and garment polychromies in the Achaemenid empire (**Figure 2.2**).²⁶ We will return to the implications of some of these ancient testimonia on color and archaeological manifestations in the context of empirical evidence.

SEEING COLORS AND GILDING IN THE EARLY YEARS

As we turn to early modern travelers who bear witness to the monuments of Persepolis and Susa, we must be aware of the fact that many of these individuals were well versed in both the classics and the Hebrew Bible. Thus, they will not have arrived at the sites with a strong assumption that color would be an important aspect of the remains. That said, it will become apparent that several of the early travelers who visited the ruins during the Safavid period were deeply impressed by the polychromies they found at the contemporaneous courts of Persia. This awareness might have made them more attuned to remnants of color and gilding at past monuments like Persepolis, too. It is of interest that some visitors were receptive to engagement with the vestiges of

²⁶ Groemer and Amin Shirazi 2020; Stöllner et al. 2020, 312 no. 152; I am grateful to Abolfazl Aali, Natascha Bagherpour-Kashani, Karina Groemer, Fabian Schapals, and Thomas Stöllner for sharing information and permission to publish a photograph.



2.2. Fragile miner's woolen belt ("Saltman 3") with blue, yellow, red, and brown warps, excavated at Douzklakh, Iran, detail. Original textile remains like these help us significantly to understand better the polychrome environments of those depicted at Achaemenid Persian monuments during the same time. Photo: Karina Grömer

color on the ruins and others were apparently oblivious to the same evidence.²⁷

Evidence for paint and gilding on the monuments of Persepolis and Naqsh-e Rostam were observed and documented from at least the seventeenth century. These observations are critical pieces of information for us, for several reasons. On the one hand, they supply precious data on the original appearance of monuments before many fragile vestiges of pigments and overlays disappeared. On the other hand, they offer valuable instruction on several

²⁷ Mousavi (2002, 2012) has recently documented the overall history and exploration of excavations at Persepolis. Early modern regional explorations have now been discussed in Allen and Carey (2021). I instead focus specifically on early observations of the polychromatic aspect of the monuments on the site. Early western travelers include the Franciscan monk Odoric of Pordeone who visited the ruins in the early fourteenth century, the Venetian Giosofat Barbaro (1413–94) in 1472, the Augustinian friar Antoine de Gouvea, and the English John Cartwright in 1611. The Spanish diplomat Don de Garcia de Silva Figueroa (1550–1624) was the first who is known to have copied inscriptions on the platform in 1617 as did Pietro della Valle in 1621: Sarkosh Curtis 2007, 166. None of these published any statement on paint or gilding seen on the monuments.

issues of which we must be aware. That a specific early traveler did not comment on surface coatings does not necessarily mean that these were not there when he visited. It may just not have seemed important or interesting to him. As we have seen, interest in polychromy is not universally shared. In other cases, a specific traveler may not indicate on which structures he saw traces of paint that he refers to in his writing or “documents” in a visual presentation. In some cases, evidence expressed in written form may have been meant to serve a different purpose than the same early observer’s characterization in the form of a graphic or other visual display. Finally, we cannot be sure whether what appeared to an early observer as colorant may not have been remains of dust, vestiges of natural deterioration processes, or the like.

In one of the early modern preserved descriptions of a European traveler, Thomas Herbert (1606–82), who visited the Takht in 1630, described what appeared to him as gold inlays:

The walls . . . have been illustrated with gold, which in some places is visible, the stones in many parts so well polished, that they equal for brightness a steel mirror.²⁸

Later authors have questioned Herbert’s comments on possible remains of gilding in Persepolis.²⁹ It is important, however, to note that Herbert was not the only one to remark on what appeared to be gilding on stone reliefs. Only two generations later, in December 1685, Engelbert Kaempfer (1651–1716) visited the ruins at Naqsh-e Rostam and Persepolis and remarked specifically on the embellishment of inscriptions in cuneiform letters: “Certain spaces in

²⁸ Herbert 1634, 59. Herbert was a member of the British embassy to Persia under Sir Dodmore Cotton and lived in Persia between 1627 and 1630 (Ferrier 1977; Vickers 1991). On travelers in Iran from the Safavid to the Qajar period, see Briant 2020; Matthee 2016. This period has been known for its “art of brilliant surface . . . which for the most part relies on immediate impact, whether to dazzle or startle or shock” (Welch 1973, 11). Herbert described contemporary Persia in bright colors: “In Shiraz . . . the refulgent splendor of their [i.e. the Mosque’s] blueness, gain admiration in the beholders . . . are round like theaters, their outside styling, pargetted with azure stones, resembling turquoises . . . In Qazvin . . . there was the King’s Palace built of raw bricks, trellised with carved windows, both painted and varnished with blew, red and yellow, mixed with Arabique knots and poesies of gold and azure” (Ferrier 1977, 81, 86). Herbert also commented on a chamber of the Shah at Ashraf near the Caspian Sea, painted by a Dutch artist only one generation before: Carswell 1972, 77; Ferrier 1977, 84–5, n. 11. On the social strategies of decorative allure of the palaces of Isfahan in the Safavid period see Babaie 2008; Canby 2009. On colors in Safavid architecture: Ardalan 1974. On recent investigations on the process of gilding in the palaces of seventeenth-century Isfahan, see Holakooei et al. 2013. Recent studies on more pigments from seventeenth-century Isfahan: Karimy and Holakooei 2021.

²⁹ Weld-Blundell 1893, 557.

these glimmer and shine with color, as if they were once [have been erased] or filled up by metal.”³⁰

According to Wiesehöfer, Kaempfer was specifically referring to the inscriptions of Darius at the south side of the terrace.³¹ Gold in cuneiform letters carved on architectural surfaces on the Persepolis Takht is also mentioned by the French travelers André Daulier-Deslandes (1654–1719) and Jean Chardin (1643–1713). Chardin was a jewelry master at the court of the Safavid Shah Suleiman I (r. 1666–94) and visited the ruins on the terrace of Persepolis on at least three occasions.³²

More explicit commentaries on preserved remains of antique polychromies on the Takht we owe to nineteenth-century antiquarians. A group of English aristocrats accompanying the brothers William Ouseley (1767–1842) and Gore Ouseley (1770–1844), including Robert Gordon (1791–1847) and James Morier (1782–1849), “excavated” on the Takht in May and July 1811. In direct contrast to Daulier-Deslandes and Chardin before him, W. Ouseley commented of his group’s findings that “no traces of either gold or of paint were visible on the figures which Mr. Morier’s workmen brought to light . . . when with him, I examined them, and should have almost imagined, from their fresh and perfect state, that they had been newly executed.”³³

Reasserting a sharp impression of Persepolitan polychromy, however, James Buckingham (1786–1855), who visited the ruins on the Takht in October 1815, stands as an unequivocal witness. Describing the ruins, which reminded him of those of ancient Egyptian architecture, he states without further elaboration that “the sculpture at Persepolis was painted, mostly in blue, a favorite color of Egypt, but sometimes in black and in yellow”.³⁴ Buckingham is the first modern traveler who comments on the importance of blue. It is regrettable that he did not expand further on his observations.

³⁰ “*Lacunae quaedam in iis aureate micant colore, quasi hoc metallo olim oblatae vel repletae fuerint.*” Kaempfer 1712, 336; cp. Drijvers 1993; Haberland 2005; Hinz 1984; Meier-Lemgo 1933; Wiesehöfer 1991, 80, 87.

³¹ DPg = Wiesehöfer 1991, 85.

³² Daulier-Deslandes 1673, 61: “It appears that many of the characters are gilded.” = “Il parfois encore à plusieurs de ces caractères qu’il ont resté dorez.” Daulier-Deslandes was accompanied by the French scholar Jean de Thévenot (Chardin 1711, vol. 8: 321. Ferrier 1996; cp. Mousavi 2002, 215). Chardin studied the remains of Persepolis on three occasions in 1667, 1673, and 1674 when he was accompanied by the artist Guillaume-Joseph Grelot (Chardin 1711, vol. 9: 107). As Herbert had done before him, Chardin commented often on the colorful interiors of the monuments in then-contemporary Safavid Persia. Describing the mausoleum of Shah Abbas II at Qom he notes: “Everything is painted in rich Moresque designs with colors lively enough to dazzle. Gold and blue is everywhere and applied so profusely that one could say it is fused together” (Chardin 1711, vol. II: 435).

³³ Ouseley 1819–23, vol. II: 238, 281–3; cp. Curtis (1998, 48), for the background of the expedition.

³⁴ Buckingham 1829, vol. I: 493.

CHARLES TEXIER, THE FATHER OF MODERN APPROACHES TO PERSEPOLITAN POLYCHROMIES

Today, Charles Texier (1802–71) could be considered the father of modern analytical research on ancient polychromy on the Takht. Texier was not only the first to place the monuments and reliefs on the palace terrace in a proper ancient context. He was also the first investigator to pay significant and systematic attention to the surface embellishments of the monuments. Together with his travel companions, Comte de Guiche and Comte de la Bourdonnaye, Baron Texier visited the Takht and Naqsh-e Rostam for ten days beginning on January 17, 1840.³⁵ The main goal of their expedition was to provide more detailed plans of the Takht and its ruins (1842, i). Yet the observations made by Texier and his team on polychromy are very rich. One of the real triumphs of Texier's testimony is best understood in his own words:

Indeed, the crux of my visit to Persepolis is the positive recognition of the paintings that decorated the bas-reliefs. If I have communicated this fact with eagerness to scholars and the press, it is not based only on opinion: the testimony of my eyes alone was not sufficient for me in several places and by the application of chemistry colored parts were revived, so it was for me a fact proven and indisputable.³⁶

This statement introduces the first of two volumes in 1842. Yet it took another ten years, until 1852, before the full report on the observations on the Persepolitan monuments was published. Texier's words indicate that he arrived at the site with expectations of the potential recovery of evidence of polychromy on the monuments. A few passages from the second volume are sufficient to highlight points of discussion and the remarkable clearness of his presentations. For instance, after examining a particular relief depicting a king and two servants he noted:

When I had to draw the figure of the king, followed by his two servants, I had to admit the certain, irrefutable presence of the paint of the bas-reliefs. Indeed I saw under the surface coating, which is nowadays as polished as a mirror, rosettes lightly drawn with a stylus, and that could only be the outline of a painted ornament on the coating; I saw the same

³⁵ Texier 1842, xxxvii–iii; 1852, 163. Texier left a graffito on the Gate of all Lands (Simpson 2004, 63).

³⁶ “[J]e ne sache pas qu’aucun fait nouveau ait surgi de cette exploration: bien plus, elle tendait, jusqu’à un certain point, à faire rétrograder les découvertes que nous avions faites. En effet, le point capital de ma visite à Persépolis est la reconnaissance positive des peintures qui décoraient les bas-reliefs. Si je me suis empressé de communiquer ce fait aux savants et à la presse, c’est qu’il ne reposait pas seulement sur une opinion: le témoignage de mes yeux ne m’avait pas suffi et en plusieurs endroits l’application de réactifs avait fait revivre certaines parties colorées; c’était donc pour moi un fait démontré et incontestable” (1842, iv–v, trans. mine).

ornament on the servants' hats. The king's tiara, as we know it today, is only a massive cylinder-shaped item; but we notice two holes on it that were used to seal a more decorated headgear made of bronze or a more precious metal. This one element would prove by itself that the sculpture was polychrome. Had the coating been designed to bear only one color, the ornaments that cover it would have been raised patterns, like the rosettes around the bas-reliefs; drawing simple ornaments on the sculptures with a chisel was never one of the ancient craftsmen's habits.³⁷

Texier was the first person to use a chemical experiment to get “behind” the materials employed on the surface. He experimented with acid to understand the components of the surface finishing. Unfortunately, he did not leave a specific document indicating on which part of which relief he conducted his analysis. Texier continued to comment on his observations:

In another bas-relief, I identified a coating I previously mentioned, which had a blackish appearance. I scraped the stone smoothly, and dissolved the dust in hydrochloric acid, as I had kept a little box of reagents. I obtained a gray residue, and threw it in a pipe that contained ammonia, and twenty-four hours later I obtained a beautiful blue-colored solution. It was, without any doubt, an application of blue ash, the base of which is copper, and which was used as an ointment on the sculptures.³⁸

Texier provided a color reconstruction of a Persepolis relief, depicting a king with two attendants (Texier 1852: plate 111 (CXI) ter; **Figure 2.1**). Although Augustin François Lemaître (1797–1870) was the graveur for most of Texier's works, the specific illustration is signed by Jean Engelmann (1816–75) from Engelmann and Graf. The rendering of the specific relief is quite faithful in composition and iconography to a motif well known from palace door jambs on the Takht. It may have been a rendering of a door jamb relief in the Palace of Darius³⁹ or the Central Building, the only other structure that has the figure in the winged disk above the king as shown in Texier's drawing which was standing during his visit.⁴⁰

Texier's stunning and original portrayal of this relief sculpture in a chromolithograph is today one of the most vivid and iconic reconstructions of ancient

³⁷ Texier 1852, 188–9, trans. M. Thiam.

³⁸ Texier 1852, 189. “Je grattai la pierre avec soin, et fis dissoudre la poussière dans de l'acide hydrochlorique, car j'avais avec moi une petite boîte de réactifs. J'obtins un résidu de couleur grise, qui, jeté à son tour dans un tube contenant de l'ammoniaque, me donna, vingt-quatre heures après, une solution d'une belle couleur bleue. C'était, à n'en pas douter, une application de cendre bleue dont la base est du cuivre, qui servait de fond à ces sculptures” (trans. M. Thiam).

³⁹ Tilia 1978, figure 28 or figure 45.

⁴⁰ Root 1979, 96, figure 12; plate XXV figures 25a–25b.

Persepolitan relief polychromy. The figures are set against a blue background. All details, including the skin and the hair, are deliberately covered with paint. There is no part of the relief where the stone itself shines through. The garments and headdresses are elaborately embellished. In the accompanying text, Texier stated that his reconstruction was based on observations he made on the surface of a number of reliefs, all depicting the same subject, though he admitted that his reconstructions do not necessarily approximate the original colors.⁴¹ Texier's conclusions that the royal headgear on some reliefs had originally served for attachments made out of precious metal would need further elaboration today.⁴² So far, Persepolis remains, together with Pasargadae among the few sixth- and fifth-century BCE sites in western Asia where there is evidence of carefully planned inlays in stone reliefs, a feature missing in earlier reliefs produced in stone in western Asia (**Figure 2.3**).

Texier's attention to polychromy as a key element on the remaining monuments of Persepolis was prescient in many respects. This episode is an interesting attestation of the notion of "scientific" testing at this early date, even though Texier's method and results cannot be used to verify any evidence on the original intended color here.

Despite the habit of displaying painted plaster casts of ancient western Asian monuments in nineteenth-century public and private collections, there are only a few documented attempts to restore the polychromy of the then visible Achaemenid Persian stone sculptures. We often lack important contextual information. One example is a painted plaster cast from Persepolis which must have been on display in the Louvre (**Figures 2.4 and 2.5**).⁴³ Lottin de Laval's nineteenth-century tinted plaster cast of a Persian noble from wing A of the north façade of the Apadana, with the cast made between 1845 and 1850 after he had taken moulds from a large number of relief façades on the site (see Chapter 4), must have been, in part, inspired by Texier's discoveries and one wonders whether they communicated. Nevertheless, de Laval's work has been considered as a product of fantasy based on little evidence.⁴⁴ In a similar vein, there is no information available as to why the Achaemenid bull capitals recreated as part of the Assyrian palace in the upper floor of the Nineveh Court at the Crystal Palace in Sydenham were rendered in blue in 1854.⁴⁵

⁴¹ Texier 1852, 188–90, 222. ⁴² Cp. Schmidt 1957, 72–3.

⁴³ The painted plaster cast of a Persian noble from the Apadana north façade, wing A, in the Louvre, Paris was probably executed between 1845 and 1850 and inspired by the work of Texier. See Briant 2001, 104–5; Lambert and Roux 1998, 44.

⁴⁴ Lambert and Roux 1998, 24: "Lottin de Laval aurait pu se servir des relevés et travaux de Texier pour réaliser son propre travail. Pour autant, il a pu tout aussi bien inventer la polychromie" (cp. Briant 2001, 105).

⁴⁵ Piggott 2004, 96. Fergusson and Layard obviously had their own ideas on how to paint these (see Chapter 1).



2.3. Door jamb, Palace of Darius, Persepolis, with holes for inlays made from precious materials. Photo: Author

Subsequent investigators who dealt with the surface of the decorations on the Takht remained oblivious to the issue of polychromy. The Frenchman Eugène Flandin (1809–71), a painter, and his architect-companion Pascal Coste (1787–1879), visited the ruins shortly after Texier (in December 1840 and early 1841). Yet their extensive documentation and study of the site did not include *any* comments on traces of pigments on the standing remains.⁴⁶ This is all the more remarkable in view of the profession of these two men.

ACHAEMENID (AND ELAMITE) BLUES: FRÉDÉRIC HOUSSAY AND NAQSH-E RUSTAM

After Texier, it took more than thirty years until another Frenchman noted pigments on stone in the greater Persepolitan area: references to paint were identified, this time on the façade of the Tomb of Darius I at Naqsh-e Rostam. In 1885, the botanist Frédéric Houssay (1860–1920), the youngest member of the French Mission to Susa, visited many sites in Khuzestan and Fars. He noted that the letters of the inscriptions on the façade of the Tomb of Darius I at Naqsh-e Rostam stood out blue against the natural gray of stone:

⁴⁶ Flandin 1851, 134–5.



2.4. Lottin de Laval's reconstruction of the original polychromy of a relief from the north façade of the Apadana in Persepolis (1845–50), Musée du Louvre, Paris, RS 623. Musée du Louvre, Dist. RMN-Grand Palais/Thierry Ollivier/Art Resource, NY



2.5. Original relief on the north façade of the Apadana at Persepolis, 2008. Photo: Author

The inscriptions were hidden under a coating of limestone, less visible in the rest. After the protective coating was chiseled away, they appeared blue. This is the first time, I believe, that traces of paint on the cuneiform characters are attested. (trans. mine)⁴⁷

Houssay also observed abundant traces of paint on the garments of the rulers depicted on the Elamite rock reliefs at Kul-e Farah near Izeh/Malamir 150 km northeast of Susa.⁴⁸

“BEWARE, YOU MODERNS OF DEGENERATE MIND!” THE DIEULAFOYS ON THE POLYCHROMY OF ACHAEMENID SUSÁ

Although authoritative travelers and travel accounts noted vestiges of pigments on the visible structures above ground on the Persepolis Takht, the Achaemenid Persian palaces seem to have remained white in the minds of many nineteenth-century European artists.⁴⁹ This changed when a second major Achaemenid capital reappeared on the radar of European thinking about the polychrome pasts of western Asia: archaeological explorations at Susa offered striking evidence for the original polychromies of the Achaemenid Persian architectural environment.

In 1884, four Europeans set out in search of the palaces of Persia’s past. Marcel Dieulafoy (1844–1920), his wife Jane (1851–1916) (**Figure 2.6**), accompanied by two young Frenchmen, the engineer Charles Babin and the botanist Frédéric Houssay, would soon open up a new chapter in the field of research on the polychromy of Achaemenid Persia. Their travels to Khuzestan and Fars occurred during a time in which a small group of local authorities were open to foreign exploitations and permits to excavate. The work in the ground was done by local communities, however. Already by the spring of

⁴⁷ Dieulafoy 1885, 227: “Les inscriptions nouvelles étaient cachées sous un enduit calcaire, au reste peu adhérent. Après la chute de l’enduit protecteur, elles sont apparues en bleu. C’est la première fois, je crois, que l’on constate des traces de peintures sur les caractères cunéiformes gravés. Les grands textes achéménides qui ornaient le revêtement en faïence du portique d’Artaxerxès sont blancs sur fond bleu.” Cp. Perrot and Chipiez 1890, 559 (Engl. 1892, 159). Photographs taken by Houssay and Babin from the inscriptions were later used to decipher various parts of the inscriptions (Weissbach 1911, xix).

⁴⁸ Dieulafoy 1885, 226: “Cette passementerie à tons bleu, blanc et or a de singulières affinités de dessin avec les couronnes et les colliers portés en Égypte.” On the monuments: Alvarez-Mon 2012; Jéquier 1901; Potts 1999, 253–4; and Van den Berghe 1963.

⁴⁹ In 1878, the English painter Edwin Long (1829–91) exhibited his fanciful “Queen Esther in Ahasuerus’ Palace at Susa” at the Royal Academy. In the background of the painting he depicted the cavetto of the door frame with alternating blue and red leaves while the rest of the palace walls remained entirely white: Allen 2005, 175, figure 7.11 (National Gallery of Victoria, Melbourne). This is in line with other contemporary artists depicting ancient western Asia in white. See, e.g. Frederick A. Bridgman’s (1847–1928) “Diversion of an Assyrian King,” c. 1878 (Hobart Collection, San Francisco).



2.6. Portrait of Jane Dieulafoy (1851–1916), Musée Carnavalet, Paris. Photographie de Waléry. Photo: PWB Images/Alamy Stock Photo

1885, the workmen discovered fragments of glazed bricks depicting colorful lions, fantastic creatures, and human guards in Susa (**Figure 2.7**). Jane Dieulafoy left the following vivid description of her first encounters:

Behold then, aroused from among the dead, this antique polychromy, denied, exalted, and contested with violence in the archaeological tournaments! . . . By what, moderns of degenerate mind, do you dare to accuse the monumental painting of Elam and of Hellas of brutality and *barbarism*? Can you be the representatives of those enfeebled races which sneer of their ancestors and do not even venture to raise them? Would you deny the important role of color, in default of having understood it and being able to give it in architecture the place which it merits? [emphasis mine]⁵⁰

⁵⁰ Dieulafoy 1888, 122, 131–3; Dieulafoy 1890, 218–22, entry in diary December 31, 1885. These first excavations at Susa were sponsored by the Musées Nationaux (Director Louis de Ronchaud) and conducted in two campaigns, between January and May 1885 and December 1885 and March 1886.



2.7. Idealized commercial illustration with workers and Jane and Marcel Dieulafoy at Susa, Khuzestan, late nineteenth century. SPCOLLECTION/Alamy Stock Photo

The use of the word “barbarism” in relation to polychromy and painting is interesting. Dieulafoy’s sentimental outbreak echoes the contemporary situation in trying to cope with the overwhelming evidence for polychromy in the ancient world, which met with the academic difficulties in restoring “ancient realities.” It may reflect the “chromophobia” that dominated Paris in the second half of the nineteenth century.

The rediscoveries of the colorful brick fragments from façades at Susa and their subsequent removal to Paris (and elsewhere) where they allowed for further reconstruction in much celebrated and spectacular friezes were a sensation. Today, these striking and complex reconstructions provide extraordinary evidence for the art and crafting of polychromy reconstructions in the late nineteenth century. Work on the fragments can be compared to similar experiences for the reconstructions of Khorsabad's glazed brick façades, which Ariane Thomas recently described as puzzle work.⁵¹ In June 1888, two rooms displaying the finds from Susa that included reconstructions of the glazed brick façades were opened in the Louvre (**Figure 2.8**). A third room (Salle VIII), containing a model of the Apadana, was added in 1891.⁵² Nicole Chevalier has recently described how the spectacular reconstructions and displays caused great enthusiasm among “partisans d’une architecture polychrome.”⁵³ The American Morris Jastrow Jr. (1861–1921) celebrated the artistic merits of both Dieulafoy's reconstructions as well as the work of the artisans working at the Achaemenid courts in an article in the *New York Times* in December 1888:

The glazed tiles . . . have been restored to view, the coloring on the tiles is almost as fresh and as gaudy as though the glazure had been put up on within a few years. Specimens of glazed bricks have been found beneath the mounds of Upper and Lower Mesopotamia which date probably from a period anterior the conquest of the country of Persia . . . but the art of glazing could never have been carried to that perfection in Babylonia and Assyria as was the case in Persia under the Achaemenid dynasty.⁵⁴

AN AESTHETICS OF REPAIR: SUSA AT THE WORLD EXHIBITION IN PARIS IN 1889

An installation at the *Exposition rétrospective du travail et des sciences anthropologiques* (Retrospective Exposition of Labor and of the Anthropological Sciences) in Paris in summer 1889 provided new ideas about the original character of the polychromies of the stone monuments, now combined with reconstructed glazed façades of an Achaemenid Persian palace. This installation featured the first reproductions of the Susian glazed friezes depicting lions and guards as they were envisioned by the French artists Charles-Louis Lesueur (1856–1935) and Émile Muller (1823–89).⁵⁵ Also, very much like thirty-five years before at

⁵¹ Thomas 2020. ⁵² Billerbeck 1893, 137; Chevalier 2010, 88–9; Chevalier 2020.

⁵³ Chevalier 2010, 88. ⁵⁴ Jastrow 1888, 13.

⁵⁵ Chevalier 2020; Papet 2018, 129. Muller and Lesueur also crafted vases in the shape of the polychrome glazed brick fragments discovered at Susa. The “Archer Frieze” reconstruction inspired a number of contemporaneous Parisian architects. Today, copies are still on display in a church in Ville-d’Avray, southwest of Paris, and in a building in Vitry-sur-Seine in Paris. The 1889 exposition also featured a polychrome reconstruction of Gudea that has been well



2.8. Reconstructed glazed brick relief panel from a larger frieze depicting rows of guards from the Palace of Darius at Susa in the Louvre, detail. Without examination it is today often unclear which glazed fragments are original and which were made in Paris. Photo: World History Archive/Alamy Stock Photo

the Crystal Palace in Sydenham by London, an attempt was made to restore an entire ancient architectural structure in color. The “Pavillon des Travaux Publics” offered a hypothetical, though “très jolie reconstitution”⁵⁶ of an interior of the recently discovered buildings at Susa. Columns with bull capitals were constructed in plaster and painted. It is apparent that the Dieulafoys and their collaborateurs preferred a restricted polychromy in that many parts of the stone of the column capitals were left visible. Qajar ruler Nasr ed-Din Shah (1831–96), who toured Europe between May and October 1889, visited the installations at the World Exhibition and at the Louvre at least two times in August and October and was deeply impressed.⁵⁷

The Greek government displayed photographs and drawings of recent discoveries of polychrome sculptures from the excavations on the Acropolis at Athens at the World Exhibition in 1889, which was supplemented by a polychrome model of the interior of the Parthenon crafted by Adolphe Jolly with the advice of Charles Chipiez and Georges Perrot which was lent by the Metropolitan Museum of Art in New York.⁵⁸ However, Persia was now about to become the example par excellence of ancient architectural polychromy, reproduced and becoming modern art. Museum representatives around the world requested copies of casts of these glazed brick façades. Archival evidence informs us that these reconstructions were painted in fact not in Paris but in the museums that had commissioned the acquisition of casts. Robert Smith (1822–90), keeper in the South Kensington Museum, for example, advised both the South Kensington Museum and the Edinburgh Museum on how to paint these casts (**Figure 2.9**).⁵⁹ As such, these installations turned out to be major inspirations for later reconstructions of past polychromies such as those of Walter Andrae’s Ishtar Gate of Babylon in Berlin (**Figures 2.10 and 2.11**).

Around the same time, Jane and Marcel Dieulafoy collaborated on yet another visual reconstruction of an Achaemenid palace. Here, coloration was restricted. The fame of the reconstructed spectacular glazed brick façades has

studied by later scholars: Evans 2012, 41–2 and figure 1; Chevalier 2020, 17–8. On the Louvre installations, see, now, Cotty 2018 and Thomas 2018.

⁵⁶ Chevalier 2020, 22; Gran-Aymerich and Gran-Aymerich 1991, 165.

⁵⁷ Gran-Aymerich and Gran-Aymerich 1991, 165; Nasiri-Moghaddam 2004, 75–6.

⁵⁸ Hennemeyer 2019, 165; Kader 2004, 239.

⁵⁹ *The New York Times* reported in September 1892 that the London South Kensington and Edinburgh museums had recently acquired colored casts of the “superb frieze of the Immortals” from Dieulafoy’s excavations at Susa. The casts in Edinburgh remain in storage today (A.1890.412 and 413). The casts in London’s Victoria and Albert Museum (REPRO.1891–87) were recently on display in the “Epic Iran” exhibition in 2021. I am grateful to Fuchsia Hart in London and Margaret Maitland in Edinburgh for sharing information about the archival documents related to the acquisitions.



2.9. Painted frieze of guards from the Palace of Darius at Susa in the Louvre created for the South Kensington Museum in London, c. 1890, on display in the “Epic Iran” exhibition, Victoria and Albert Museum, London, May 25, 2021. Correspondence between the curators in London and in the Louvre provides insight into what world museologists thought about color in Susa in the late nineteenth century. Photo: Malcolm Park/Alamy Stock Photo

tended to mute other evidence for Dieulafoy had noted traces of paint on some of the remaining stone monuments discovered at the site as well:

The surfaces appear as almost polished, except the hair of the depicted that appear raised with a chisel and detachment in one group. I can give proof that the eyes and hooves were gilded and the horns and ears were made of bronze. Traces of red and even a piece of gold are apparent near a drip, the yellow hooves are also reproduced on the enameled bricks.⁶⁰

⁶⁰ Dieulafoy 1890–3, 348, trans. mine. “Les surfaces sont amenées presque au poli, sauf les poils qui paraissent relevés au ciseau et se détachent ainsi sur la masse. Je puis donner la preuve que



2.10. Entirely modern reconstruction of a frieze of guards from the façade of Palace of Darius at Susa, in the Vorderasiatisches Museum, Berlin, VAM: VAG 173.1. The artwork was acquired with funding, supplied by James Simon (1851–1932). Photo: agefotostock/Alamy Stock Photo



2.111. Reconstructed brick panel with a striding lion. Babylon, Iraq, 604–562 BCE, processional way, Vorderasiatisches Museum, Berlin. Photo: Photopat/Alamy Stock Photo

Dieulafoy's observations need further critical analysis. Recent analysis conducted during the cleaning of a bull capital from Susa that had been brought to the Louvre in 1886 has revealed traces of a red paint that originally coated the cheek of the animal.⁶¹

Almost all glazed brick fragments that were unearthed at Susa were excavated from post-Achaemenid layers, where they had been reused rather haphazardly.⁶² Nevertheless, it became possible for later generations to reconstruct the placement of some of these glazed bricks into specific contexts of the palaces. A frieze of roaring lions originally filled the upper part of the East Court of the Palace of Darius, on the north wall. The frieze with lions moved

les yeux et les sabots étaient dorés et que les cornes et les oreilles étaient de bronze. Des traces de mixtion rouge et même une parcelle d'or très apparentes près d'un larmier, la couleur jaune des sabots reproduits sur les briques émaillés." Cp: Dieulafoy *ibid.* 348: "L'intérieur de la salle ils étaient revêtus de stuc rouge; sous les portiques, de stuc gris; à l'extérieur, de moellons de faïence rose pâle ou gris;" for paints on the stone monuments see also Perrot and Chipiez 1892, 421 and n. 1: "Besides glazed tiles, fragments which led to the conclusion that flat figures painted with the brush were applied to the front wall of the stairs."

⁶¹ The horns and ears of this bull capital are modern: André-Salvini 2013, 297–8.

⁶² Perrot 2013, 220.

toward a centrally placed trilingual inscription above the door.⁶³ According to more recent reconstructions by Rupp and Lopez (“Héritage Virtuel”), the frieze showing guards may have originally covered the façades of the same East Court.⁶⁴

Another group of glazed bricks, both in relief and on flat tiles, originally covered at least one staircase in the palace, consisting of servant figures resembling those carved in stone, like those on the southern staircase of the Palace of Darius on the Takht at Persepolis.⁶⁵ All of these friezes were framed with nonfigurative designs of flowers, palm leaves, and triangles.⁶⁶ While the Susa façades in Paris made for fantastic visual displays, the methods to have original fragments next to modern paints while research was ongoing reveals complex problems. An example of the color scheme should suffice here. In the chromolithograph “The Immortals” (1893), the Dieulafoys suggested opposing a Susa and Persia contingent based on different iconographies. Here, even the color schemes of the shoe fragments became a contested area. The shoes of the Susa contingent were reconstructed in blue and yellow, whereas the Persian contingents were only yellow. For the Susa contingents, the Dieulafoys preferred a darker skin tone, for the Persian contingents a whiter

⁶³ Muscarella et al. 1992, 224; Perrot 2013, 220.

⁶⁴ Curtis and Tallis 2005, 51; Perrot 2013, 227, figure 239.

⁶⁵ Curtis and Tallis 2005, 89–91; Daucé 2013, 320.

⁶⁶ Muscarella et al. 1992, 224. It remains impossible to reconstruct the original context of the so-called Dieulafof parapet today. Daucé 2013, 320. In the course of the twentieth century, many more fragments of glazed brick decorations were excavated at Susa (Daucé 2013, 306–10). Out of approximately 13,000 brick fragments discovered in time, the majority remain in the modern museum at Shush (c. 5,800), and the Louvre in Paris has c. 5,000 glazed silicious bricks and 1,500 in terracotta and relief. The collection of the National Museum in Tehran is smaller (c. 500 bricks). Caution must reign with respect to the interpretation of the publication of more recent excavations on the western side below the platform, which produced nearly 1,000 fragments of glazed bricks, many of them with floral and geometrical designs, but also with depictions of humans in two sizes, some of human proportion, others of a third of the human size (Kaboli 2000). Initially it was thought that the brick fragments belonged to a gateway – similar to the late Babylonian precedent at Babylon, and that the décor belonged to a staircase leading to the top of the platform (Kaboli 2000, 162). According to Kaboli, this gate on the sustaining wall (different from the palace wall with the “poterne”) was “placed at the bottom of the wall,” thus some 10 m below the level of the palace. It would have followed “a semi-circular plan, a plan which is not known from other surviving Achaemenid architecture.” As Rémy Boucharlat (2014, pers. comm.) pointed out to me, there is a disagreement between Kaboli and Perrot, and it is likely that these glazed bricks were not from such a staircase or gateway. Perrot expressed orally to Boucharlat that the large opening referred to by Kaboli would be the outlet of a sewer running east to west. Concerning the thousands of glazed brick fragments from the period of Darius I, these were already referred to by de Mecquenem and Perrot together (with baked bricks with a stamp of a lion from the reign of Artaxerxes II) in the foundations of a sustaining wall repaired by Artaxerxes II. According to Boucharlat, the fragments of one-third life-size human depictions on the glazed bricks would not be from the period of Darius I, because they do exist in Donjon and at the Chaour, where they date from the time of Artaxerxes II.

skin tone.⁶⁷ The complicated modern history of the restoration of these glazed brick façades and their importance for the study of Achaemenid Persian polychromy cannot be underestimated. Bedazzling as they are, the majority indicates that the makers preferred a blue background. This is important as one aims to imagine the blue background of the stone reliefs for which evidence accumulated in recent years for the Apadana and the Tacara or Palace of Darius at Persepolis.

WHITE RETURNS TO PERSEPOLIS

In 1890, Perrot and Chipiez published two chromolithographic reconstructions of monuments from the Takht at Persepolis in their *Histoire de l'Art*. Discrediting Texier in that he “cannot always be relied upon,” they asked whether “the Persian architect would have been content, like the Egyptians and the yet more judicious Greeks, to overlay stone, mouldings, and sculpture with one coat of colour.” Their statement aligns with renewed discussions of polychromy on Assyrian palace reliefs in these same years.⁶⁸

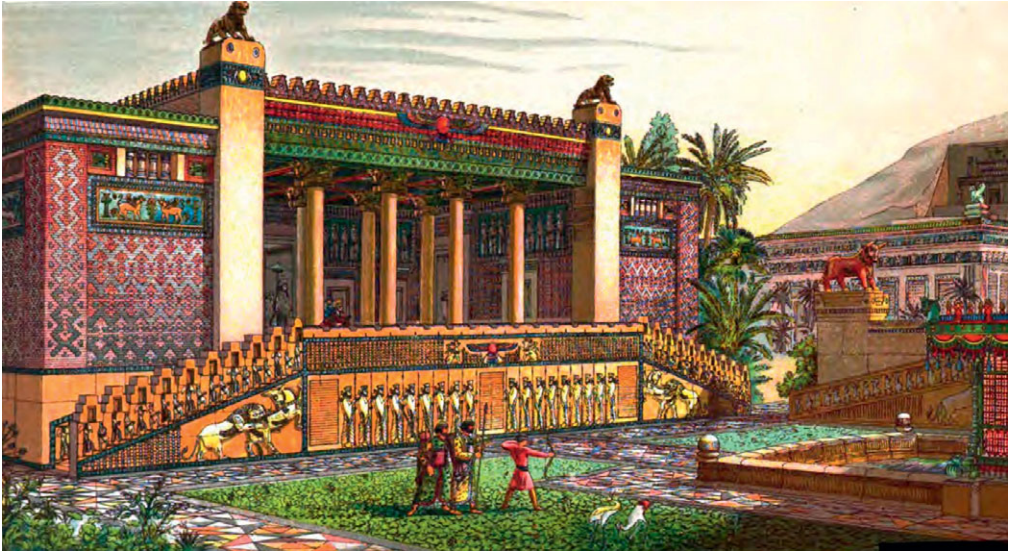
Based upon the judgments of Flandin, Coste, and Dieulafoy rather than upon those of Texier, the two chromolithographs reinforced the proposals by Perrot and Chipiez. They state that the Achaemenid Persians used “this [polychrome] mode of decoration with extreme reserve, and nowhere has the stone been tinted.”⁶⁹ All reliefs of the restored structure of the Palace of Darius in Persepolis are shown in white, in the tradition of Flandin and Coste. Color is limited to the glazed bricks unearthed there (**Figure 2.12**).⁷⁰ A second detailed reconstruction, depicting only a corner of the massive Apadana, shows the bull capitals with color applied only to the eyes, the eyebrows, the horns, ears, and a few ornaments and was based on Dieulafoy’s more recent reconstructions (**Figure 2.13**).

The reluctance of Perrot and Chipiez to invest in the evidence of ancient polychromy more wholeheartedly is somewhat surprising, as they were working nearly parallel on various polychrome reconstructions of classical Greek architecture and sculpture where they were clearly not as reluctant to the use of polychromy.⁷¹

⁶⁷ Dieulafoy 1890–1893, plates VI and VII; Chevalier 2013, 66. The history of the publication of the volume is more complicated than is indicated here and warrants new research. Research on the diversity of skin colors presented on the glazed bricks notwithstanding aspects of changing appearances of them is an exciting path for future students. What concepts of race underlie the reconstructions at Paris and those at ancient Susa? See, for example, Cheal 2004.

⁶⁸ Perrot and Chipiez 1892, 158. ⁶⁹ Ibid., 161. ⁷⁰ Ibid., opposite 336.

⁷¹ Their reconstructed models of the Parthenon with a statue of Athena inside were also displayed at the World Exhibition in 1889. The model of the Parthenon is today in the Abguss-Museum in Munich. Chipiez began working on these models in 1883. For more



2.12. Reconstruction of the façade of the Palace of Darius at Persepolis. Perrot and Chipiez 1892/Alamy Stock Photo

THE BRITISH RETURN: THE POLYCHROMIES OF THE HALL OF 100 COLUMNS

On the Takht of Persepolis new evidence indicated that the stone reliefs were indeed originally painted. In early 1892, Herbert Weld-Blundell (1852–1935) conducted a series of test trenches on the terrace platform and carefully studied the surfaces of the stone monuments that had heretofore been hidden (and protected) by accumulated destruction debris. He devoted a special chapter to “Colours and Materials” and transmitted the following:

In removing some dry accumulation . . . [on] the bas-relief in the Hall of a Hundred Columns, Mr. Giuntini, the Italian formatore, found it covered with a coating of blue paint, which came away readily as fine blue powder.⁷²

Furthermore, on a small column drum from a mound of rubble next to the Palace of Darius, “yellow ochre was found in the flutings, laid on a ground of white gesso.”⁷³ He also discovered that the floors of various buildings were covered with “a smooth flooring of cement of a rich red colour.”⁷⁴ Traces of

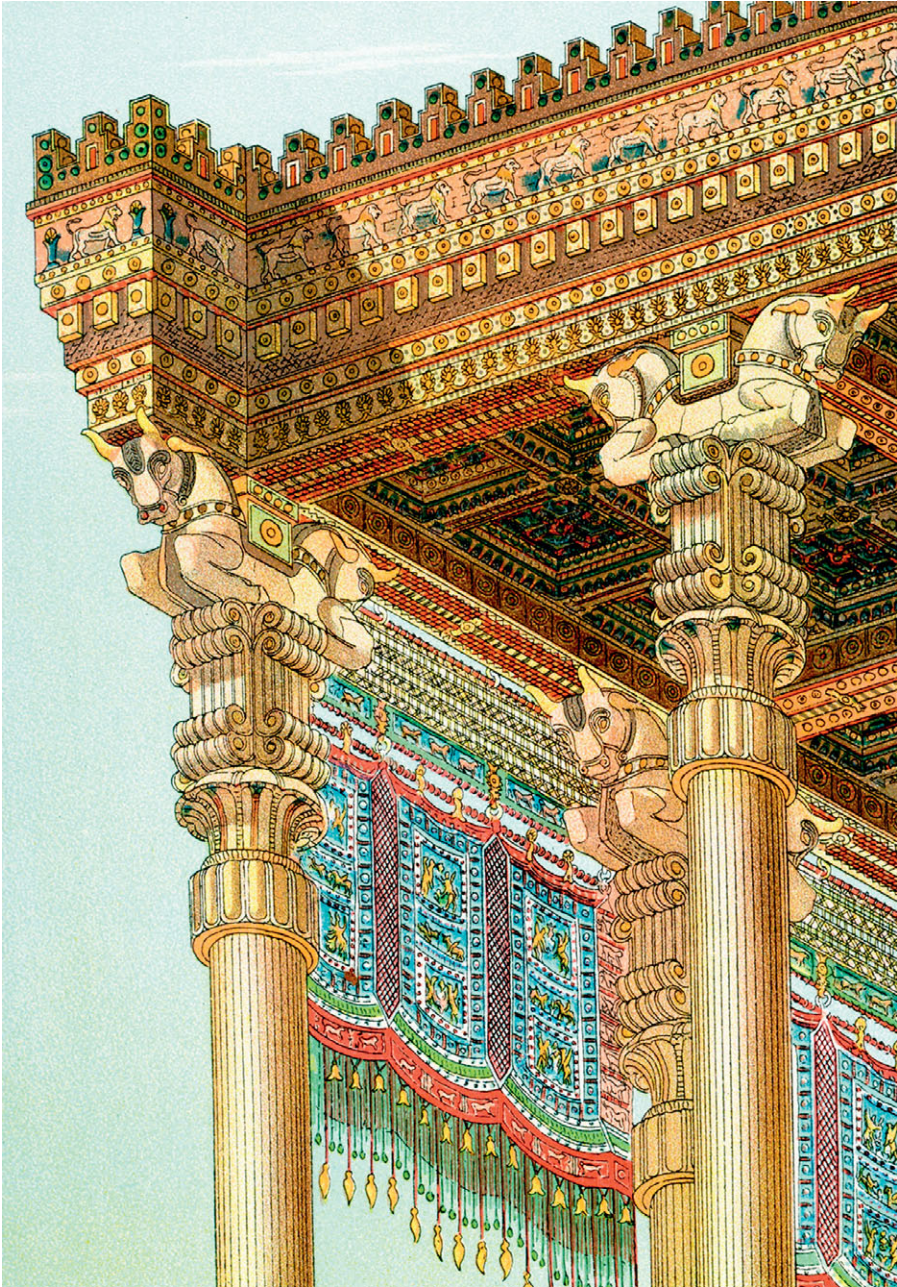
information see: <http://www.abgussmuseum.de/>; cp. Hennemeyer 2019; Kader 2004, 238.

On Perrot and Chipiez see Briant 2019.

⁷² Weld-Blundell 1893, 557.

⁷³ Ibid., 557. Similar observations were made much later by excavator Roland de Mecquenem for the stone columns in the Achaemenid palace at Susa.

⁷⁴ Weld-Blundell 1893, 538–9; Recent analysis of these floor materials: Oudbashi et al. 2022.



2.13. Reconstruction of the corner of the Apadana at Persepolis. Perrot and Chipiez 1892/
Alamy Stock Photo

this surface treatment of selected floors continued to be revealed throughout the twentieth century (**Figure 2.14**).

Importantly, Weld-Blundell is also the first to explicitly acknowledge the existence of glazed bricks “exactly similar to the tiles exhibited in the Louvre



2.14. Detail of red floor in the Palace of Darius, Persepolis, 2007. Photo: Author

brought from Susa” in the area immediately in front of the Apadana on the Takht.⁷⁵ In remarkable detail, he comments upon their manufacturing technique and the colorants used: greens, for instance, were determined to have been a product of vermilion; other colors were determined through his analysis to have been produced with components of sulfur and globules of mercury.⁷⁶

One of the most informative works, even today, is Curzon’s synthesis on the monuments of Achaemenid Persia in the late nineteenth century. He also notes that he did not find any traces of paint himself on the Persepolis monuments and argued that at Persepolis mainly plaster was used as a vehicle for applying paint onto stone. Because of its fragile characteristics it was vulnerable to destruction and has not survived.⁷⁷

⁷⁵ Weld-Blundell 1893, 557.

⁷⁶ He took small samples of the pigments to London where they were analyzed by William Flinders Petrie and Flaxman Charles John Spurrell, an experienced geologist at this time. It has not been possible to relocate these pigments. Unfortunately, Weld-Blundell’s London house burned down and important documents may have been lost in the fire (St John Simpson, November 2008, pers. comm.). Curzon (1892, 172) reported that “some fragments of stucco painted red,” were given by Weld-Blundell to the British Museum. For an analysis of glazed brick fragments from Persepolis, see Aloiz et al. 2016.

⁷⁷ Curzon 1892, 172.



3.1. Façade of the tomb of Darius I (†486 BCE) at Naqsh-e Rostam. Photo: Alexandre Rotenberg/Alamy Stock Photo

CHAPTER THREE

HISTORIOGRAPHICAL OVERVIEW, PART II: APPROACHING ACHAEMENID PERSIAN POLYCHROMIES IN THE TWENTIETH CENTURY

With the twentieth century came a new series of more extensive interventions on the site of Persepolis that were accompanied by more or less increased systematic documentation. While pillaging of the monuments on the site was widespread, especially during the late 1920s, scientifically documented fieldwork on the Takht was now conducted by an American team under the aegis of the Oriental Institute of the University of Chicago. Ernst Herzfeld (1879–1948) directed the field operations between 1931 and 1934.¹ He was replaced by Erich Schmidt (1897–1964) who continued through 1939.² The objective of the excavations by Schmidt “was to clear the ruined palaces of its debris, . . . to preserve the remains, [and] . . . to establish a pottery sequence for the MarvDasht region.”³ In subsequent years, important fieldwork was conducted by Iranian teams, led by Ali Sami (1910–89) between 1939 and 1959,⁴ Akbar Tajvidi (1926–2017) between 1969 and 1972⁵ and Shahpur A. Shahbazi (1942–2006) in 1975.⁶ Between 1965 and 1978, the Iranian efforts were accompanied by an Italian restoration team sponsored by the Istituto Italiano per il Medio ed Estremo

¹ Dusinberre 2005; Herzfeld 1941; Krefter 1971. ² Schmidt 1953, 1957, 1970.

³ Balcer 1991, 149–51. ⁴ See, e.g. Sami 1955; cp. Mousavi 2002, 235–9.

⁵ Tajvidi 1976; cp. Mousavi 2002, 239–45. ⁶ Mousavi 2002, 245; 2012.

Oriente in Rome. This team was then led by Giuseppe Tilia (1931–2001) and Ann Britt Peterson Tilia (1926–88).⁷

In terms of any attempt at synthetic presentation of polychromies on the site, the pioneering works of Judith Lerner (1971, 1973, 1976), and of Ann Britt Tilia (1978), operating independently, loom large, since throughout this extended period of interventions on the site, evidence of polychromy continued to emerge. Their archives and efforts will be highlighted here and used to show the complexities involved in documenting aspects of the surface, the architectural finishes, and polychromy of the Persepolis stone monuments. Despite the work of Lerner and Tilia, it was not until 1984 that the first modern scientific analysis of pigments retrieved from surfaces of the architecture and sculptures at Persepolis was published.⁸

While this chapter continues to guide the reader through the modern discovery of Persepolis polychromy in a chronological order, diachronic case studies from the Hall of 100 Columns (finished by Artaxerxes II), and the façade of the Tomb of Darius I at Naqsh-e Rostam will be introduced to highlight specific complexities of the issues in play. I will discuss glazed brick ornamentation, columns, and the evidence from excavated pigment bowls. The general picture that emerges across most of the first decades of the twentieth century is one in which casual observations, fairly narrowly circumscribed but systematic documentary efforts, and larger-scale investigations have tended to remain disconnected one from another. A lack of communication between the various parties involved in considering aspects of color and gilding in Persepolis meant that ideas were not shared, important evidence and records of discoveries were lost or ignored post-excavation, and much evidence that reached the storerooms safely was seldom properly cataloged.

IMAGING AND IMAGINING ACHAEMENID PERSIA IN THE EARLY TWENTIETH CENTURY

In the first two decades of the twentieth century, Achaemenid Persia became an increasing focal point for European imagining of the ancient Orient, particularly among French and German scholars. Academic interest was reflected in growing popular exposure to ancient Persia and its glorious past.

In August 1902, “Parysatis” premiered on stage at the open air arena of Béziers in Southern France, the summer residence of the Dieulafoys.⁹

⁷ Sajjidi and Shirazi 2023. In addition to excavation and restoration work, a U.S. initiative began an archaeological survey in the MarvDasht plain (Sumner 1986). See the much more expanded work of Alireza Askari Chaverdi, Mohammad Taghi Atayi, Sebastien Gondet, Kourosh Mohammadkhani, Pierfrancesco Callieri, and many other colleagues.

⁸ Stodulski et al. 1984. ⁹ Dieulafoy 1902.

The libretto for this production was adapted from an earlier one based on a “roman historique” following a “roman archéologique” by Jane Dieulafoy, published in 1890. The staging and costumes for the 1902 “Parysatis” were designed by her and Marcel Dieulafoy based on the recent archaeological discoveries at Susa. In the third act, the audience experienced a set design echoing the columns of the Apadana at Susa. It is unclear to what extent the columns and walls on the stage set were painted.¹⁰

In the meantime, excavations at Susa continued.¹¹ Jacques de Morgan (1857–1924) continued the work begun by the Dieulafoys. Roland de Mecquenem (1877–1958), who had worked at Susa since 1903, was officially entrusted with supervising new excavations many of which focused on the Palace of Darius. Here, between 1909 and 1911 the large central and western courtyards of the palace were uncovered.¹² During the many interventions on the hills of Susa, the archaeologists also uncovered fragments of worked lapis, carnelian, and other materials used in the production of polychromies on the site.

During all these years, researchers began to understand better the monumental inscriptions. They also worked on selected categories of objects from Susa and the Achaemenid Persian Empire that had been removed to the Louvre and other European collections.¹³ The Susa displays in the Louvre influenced the display of ancient western Asia collections in other museums. Restored segments of the colorful glazed brick friezes of soldiers from the Palace of Darius were sent as object exchanges from the Louvre in Paris to museums in Berlin, London, and Tehran.¹⁴ Meanwhile, the amount of colorful glazed brick and painted tile fragments kept increasing in the interventions on the site.

Early twentieth-century excavations at Susa yielded additional evidence for polychromy on the stone architectural elements. De Mecquenem noted traces of red paint on a capital from the Apadana and argued that defective parts would have been entirely overpainted.¹⁵

Despite this evidence, new architectural reconstructions of the Achaemenid palace complex at Susa remained vague about the coloring of the stone monuments. Beginning in 1912, the architect Maurice Pillet (1881–1964)

¹⁰ Gran-Aymerich and Gran-Aymerich 1991, 197–8. ¹¹ Morgan 1905.

¹² Chevalier 2013, 71–2; Ladiray 2013.

¹³ Burchardt 1911; Nagel 2022; Pézard and Pottier 1913, 1926; Toscanne 1916; Weissbach 1911.

¹⁴ Berlin: Vorderasiatisches Museum VA 14647, by exchange with the Louvre in 1936 (Wartke 1992, 239–40 no. 186); London, British Museum: former Louvre Sb 4001 = Curtis and Tallis 2005, 87 no. 51, by exchange with the Louvre in 1958; Tehran, National Museum, by exchange with the Louvre in 1959 (André-Salvini 2013, 299 n. 6).

¹⁵ De Mecquenem 1947, 38.

worked on a general survey of the original appearance of the Achaemenid Persian buildings at Susa.¹⁶ In his watercolor *The Palace of Darius*, rendered in 1913, Pillet favored a restricted polychrome palette: the archer frieze with the door frame and the cavetto were shown in blue and striking colors, but the columns including their bases and bull-headed-capitals were left white.¹⁷ Pillet's reconstruction is reminiscent of those of Place for his 1867 reconstruction of the Assyrian palace reliefs from Khorsabad and those of Perrot, Chipiez, and the Dieulafoys. In many of these reconstructions, color schemes were limited to the glazed bricks but did not appear on the stone monuments.

Meanwhile, the German orientalist Ernst Herzfeld finished his dissertation on Pasargadae at Friedrich-Wilhelm Universität in Berlin, after an initial visit to the site in 1905.¹⁸ In 1910, Herzfeld and Friedrich Sarre (1865–1945) published *Iranische Felsreliefs*.¹⁹ Herzfeld's fascination with the ancient monuments of Persia grew to the point that he took up permanent residence in Tehran beginning in 1926. He excavated at Pasargadae in 1928.²⁰ From this point onward, the modern exploration of Fars – and particularly of Persepolis – became intimately connected with Herzfeld himself and also with two other Germans: Friedrich Krefter (1898–1995) and Erich Schmidt. These men established an arena of inquiry into the Achaemenid Persian Empire based in Fars, counterbalancing the continued French monopoly held on excavations at Susa.

With officially documented large-scale excavations on the Takht of Persepolis took place on behalf of the Oriental Institute at the University of Chicago. Herzfeld led the expedition between 1931 and 1934, with Krefter serving as his architect-assistant. Herzfeld was relieved of his position and departed from Iran under clouded circumstances,²¹ relinquishing for posterity very little in the way of published documentation and analysis. Much of the work done in Persepolis during the Herzfeld years, and much of Herzfeld's thinking on his discoveries, remains puzzling. Herzfeld's publication *Iran in the Ancient East* (1941), which might have resolved some of these issues, does little to clarify the details of the work carried out.²² His posthumous study brought to fruition by Gerold Walser (1917–2000) sheds no light on issues relevant to polychromy.²³ Schmidt's tenure as expedition director (1935–39) had

¹⁶ Pillet 1914.

¹⁷ Amiet et al. 1992, 14, figure 15; Chevalier 1997, 64, plate XII; Perrot 2013, 235.

¹⁸ Herzfeld 1908. ¹⁹ Sarre and Herzfeld 1910.

²⁰ Herzfeld 1929; Nagel 2018b; Stronach 2005.

²¹ Gunter and Hauser 2005, 29–30; Mousavi 2012.

²² Dusinberre 2005; Garrison and Root 2001, 24–6; Gunter and Root 1998, 7–8.

²³ Herzfeld 1968.

difficulties and idiosyncrasies of its own. He avoided working on the Takht in those areas that were already opened by Herzfeld.²⁴

Schmidt published a three-volume excavation report.²⁵ This monumental effort focused on his own campaigns with little information on the Iranian fieldwork subsequently conducted. Today, it is clear that information from Herzfeld's excavations was transmitted to Schmidt (or deemed worthy of inclusion?) only very selectively. Not least, the Schmidt volumes are somewhat problematic in terms of our attempt to understand the evidence of polychromy and its handling at the site during the entire Chicago era at Persepolis between 1931 and 1939. It is striking and symptomatic that neither Texier's nor Weld-Blundell's crucial observations of the paints on the surfaces of the monuments on the Takht, introduced previously, entered Herzfeld's publications or the presumably *definitive* Schmidt volumes. This is especially puzzling because Schmidt did take pains to allude to observations on polychromy at Susa made by Dieulafoy, and he was interested in documenting aspects of polychromy of other materials on sites such as Rayy.²⁶ To Schmidt's credit, he demonstrated interest in the appearance of the surface of the monuments on the site in several noteworthy ways. He assigned colleagues to conduct analysis on objects²⁷ and incorporated a full colorplate for a color reconstruction of a rosette border around one of the door frames in the Treasury, to which he presented his colleague's analysis of a six-phase application.²⁸

With a general lack of published evidence on and discussion of polychromy at Persepolis from the Chicago years, Herzfeld's notebooks, reports, sketchbooks, and other documents become an important source for the study of polychromy of the monuments at Persepolis (**Figures 3.2–3.5**). The material is today shared between various research institutions, including the National Museum of Asian Art, Smithsonian Institution, Washington, DC (Ernst Herzfeld Papers, Sk = Sketchbooks; N = Notebooks and Diaries; paint samples from Pasargadae and Persepolis); the Institute for the Study of Ancient Cultures in Chicago (Letters, Excavation Reports), and the Metropolitan Museum of Art in New York (selected drawings).²⁹

²⁴ Balcer 1991, 167. During Schmidt's fieldwork on the site John S. Bolles (1935), Eliot Noyes (1935–36), and Richard Haines (1937) served as architects-foremen. All have subsequently received little attention regarding their role in the documentation on the site's monuments.

²⁵ Schmidt 1953, 1957, 1970.

²⁶ Nagel 2019; Schmidt 1953, 36; Whitcomb 2012, 144, figure C25.1. ²⁷ Matson 1953.

²⁸ Schmidt 1953, figures 68B, 160.

²⁹ General information about the Herzfeld papers in these various repositories can be found in Gunter and Hauser 2005; Hennessey 1992; Nagel and Woody 2014; Root 1976.

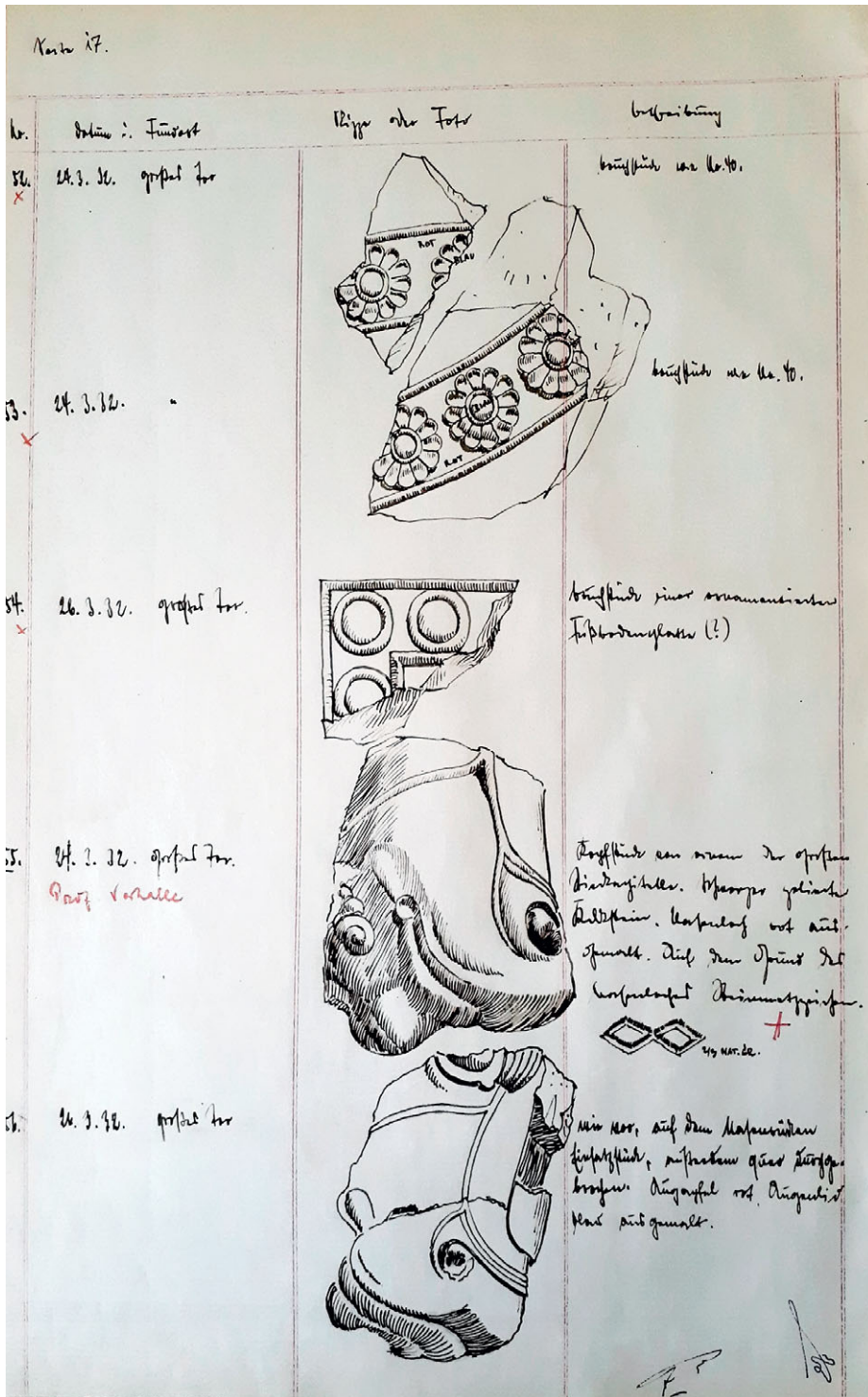


3.2. Ernst Herzfeld's team making squeezes of inscriptions on the southern façade of the Takht, December 1923. Herzfeld seldom referred to those actually performing the work. In a diary, he refers to his workmen here as Djawād and Djuml. Herzfeld Archives, National Museum of Asian Art, Smithsonian Institution, Photo Files Subseries 4.5.2 Neg. 4072

“WAS HE BLONDE?” ERNST HERZFELD AND THE POLYCHROMIES OF PERSEPOLIS

Interestingly, back in the early 1920s, even before he began his official excavations at Pasargadae, Herzfeld had observed traces of polychromy both in Pasargadae and in Persepolis. Most of this evidence remains unpublished. At Pasargadae, Herzfeld commented on traces of red in the wings and the dress of the “winged genius” on the door jamb of Gate R, which served as the main entrance to the palace area from the plain.³⁰ Returning to Pasargadae in the spring of 1928, he noted traces of paint representing vestiges of mural paintings in Palace P. Samples of painted plaster, taken from Palace P by Herzfeld are today in the Freer Study Collection of the National Museum of Asian Art,

³⁰ National Museum of Asian Art, Smithsonian Institution, Washington, DC, Ernst Herzfeld Papers, Sk-IV Skizzenbuch Persien 1923, 8 (Neg. 6871): Zeichnung und “Pasargadae: Palast mit dem Genius. Rote Farbspuren in Fransen und Flügeln.” For the Herzfeld drawings of Pasargadae sculptures see Calmeyer 1981. For Gate R and the sculpture see Root 1979, 46–9; Stronach 1978, 44–55.



3. 3. Herzfeld and his team sometimes included information on the traces of paint they noticed on the fragments excavated at Persepolis in the field books. The two fragments listed under No. 52 and No. 53, discovered on March 24, 1932, have red ("rot") and blue ("blau") still visible. For fragment No. 56 (March 26, 1932), drawn at the bottom, the handwriting describes the "eyeball red, eyelid painted in blue" ("Augapfel rot, Augenlid blau aufgemalt"). Institute for the Study of Ancient Cultures, University of Chicago (trans. mine).



3.5. Excavations on the eastern façade of the Apadana at Persepolis, Fall 1932. Photo. Courtesy of the Institute for the Study of Ancient Cultures, University of Chicago. N. 11890_P. 22784

Smithsonian Institution, Washington, DC and were analyzed recently.³¹ Visiting Persepolis in December 1923 Herzfeld remarked that on the reliefs

³¹ Aloiz et al. 2016. National Museum of Asian Art, Archives, Smithsonian Institution, Washington, DC, Ernst Herzfeld Papers, N-92: “25 April 1928, Palast P: Reste von

In the Hall of 100 Columns, the throne legs laid bare were of a bright blue color. Also, remains of red paint were found higher above on the throne, and the feather wings of Ahuramazda still have their turquoise green color.³²

He continues, writing that

while examining the column capitals it was noted that the tongues and throats of the lions of the eastern Hall of the Apadana had a more distinct layer of a red color. It only looks embossed, but it was finished, otherwise it would not have been painted. It has no sculpted details, like the bulls, e.g. curls, everything was painted on the very simplified curls . . . I also investigated the Darius of the Tachara [Palace of Darius] with the lapis-beard in search of color: it is strange that the hair of the servants show traces of paint, the Darius heads not. The curls of the king have a deep yellow tone, which is not the original color of the stone (gray black). Was he perhaps blonde?³³

One would want to know what exactly Herzfeld saw on the hair of the servants and how he knew that the Darius he is referring to had a lapis beard.³⁴ The two doorways with royal figures that have triangular cuts below the chin are situated at the north end of the main hall of the Palace of Darius.³⁵ It does seem likely that these cuts once held inlays specifically made of lapis. Indeed, numerous fragments of lapis and other blue inlays for beards were subsequently discovered in the Treasury, the so-called Harem, in a room beneath Palace D, and in a room of the garrison quarters³⁶, west of the Apadana.³⁷ Herzfeld repeatedly claimed that lapis was used in the beard and hair on the depictions of the ruler in the Palace of Darius at Persepolis.³⁸ Unfortunately, my own

Wandmalereien.” For Palace P, see Stronach 1978, 78–106 with references to paint remnants at 85.

³² National Museum of Asian Art, Archives, Smithsonian Institution, Washington, DC, Ernst Herzfeld Papers, N-84 (December 7, 1923): “Am 100 Säulen Saal waren die freigelegten Thronfüsse leuchtend hellblau, auch Farbspuren, rote, höher am Thron an den Flügeln des Ahuramazda war auch türkisgrün.” (trans. mine) Cp. Tilia 1978, 42, n. 3.

³³ National Museum of Asian Art, Archives, Smithsonian Institution, Washington, DC, Ernst Herzfeld Papers, Tagebuch N-84 (December 8, 1923): “Bei der Untersuchung der Kapitelle zeigt sich, dass die Zunge und der Rachen des Löwensattelholzes der Osthalle des Apadana eine stärkere Schicht menning-roter Farbe hatten. Es sieht nur bossiert aus, war aber demnach fertig, sonst hätte man es nicht bemalt. Es hat keine skulptierten Details, wie die Stiere, z.B. Locken, alles war auf die sehr vereinfachten Locken gemalt . . . Ich untersuchte auch den Darius des Tachara mit dem Lapis-Bart auf Farbe: es ist wunderlich, an den Haaren der Diener sieht man die Spuren der schwarzen Farbe, an den Darius Köpfen nicht. Die Locken des Königs haben eher in der Tiefe einen gelblichen Ton, der nicht Steinfarbe ist (grauschwarz). Ob er blond war?” [trans. mine].

³⁴ See Rossi 2021.

³⁵ Root 1979, 78 and figure 7; cp. Schmidt 1953, plates 140–1; Tilia 1978, plate XXVIII, figures 27–8.

³⁶ Schmidt 1957, 73. ³⁷ Tilia 1978, plate C. ³⁸ Herzfeld 1931, 67.

examination did not yield further evidence of the original inlaid materials in these cuts so far.

According to Herzfeld's notes, the polychromy of the door jambs continued above with the figure of Ahuramazda, today often referred to as "the figure in the winged disk."

Herzfeld's notes indicated that he contemplated the original appearance of the reliefs. After examining the standing door jambs in the Hall of 100 Columns in December 1923, he noted that "of those who support the dais, the negro still bears traces of black on the face."³⁹ Herzfeld is not very specific and clear as to which of the door jambs of the Hall of 100 Columns that have a depiction of a figure in the winged disk above the king supported by personifications of the subject lands he is referring. It is likely that he is referring to the Ethiopian with the curly hair in the lower row of one of the two western door jambs on the south end of the Hall.⁴⁰ Recent microscopic investigations of the supporting figures on these door jamb reliefs have not revealed any still-extant traces of paint. The throne legs, however, do still retain abundant blue paints, substantiating Herzfeld's observations, as well as layers of red paint (**Figures 3.6–3.8**).

On an ink drawing, on the same page on which Herzfeld had written about traces of paint on the "negro," he indicated the colors he saw on another (?) sculpted winged symbol on one of the door jambs of the Hall of 100 Columns. Here, Herzfeld mentions seeing traces of greens, blues, and reds.

In 1923, Herzfeld removed a foot from one of the reliefs depicting a king in the Palace of Darius. It bore traces of red paint along with graffiti depicting two bearded men, a bull, a lion, and a dog head.⁴¹ When doing exploratory work on the site in 1928, Herzfeld harvested additional fragments that became part of his private collection. Among these items is a fragment of a glazed brick relief, today in the Freer Study Collection, National Museum of Asian Art,

³⁹ National Museum of Asian Art, Archives, Smithsonian Institution, Washington, DC, Ernst Herzfeld Papers, N-84 (December 12, 1923): "Bei den Thronträgern . . . hat der Neger noch klare Spuren von schwarz im Gesicht" (trans. mine). Cp. Tilia 1978, 40 n. 4. The notion of skin color is an interesting one. There is only one further comment on skin paint by Tilia (referring to the tomb of Artaxerxes III: 1978, 43, figure 2c: traces of blue paint). There is, however, abundant evidence for various skin tones available on the glazed brick reliefs from Susa.

⁴⁰ Schmidt 1953, 136 no. W14/27 = plates 108, 109, 112.

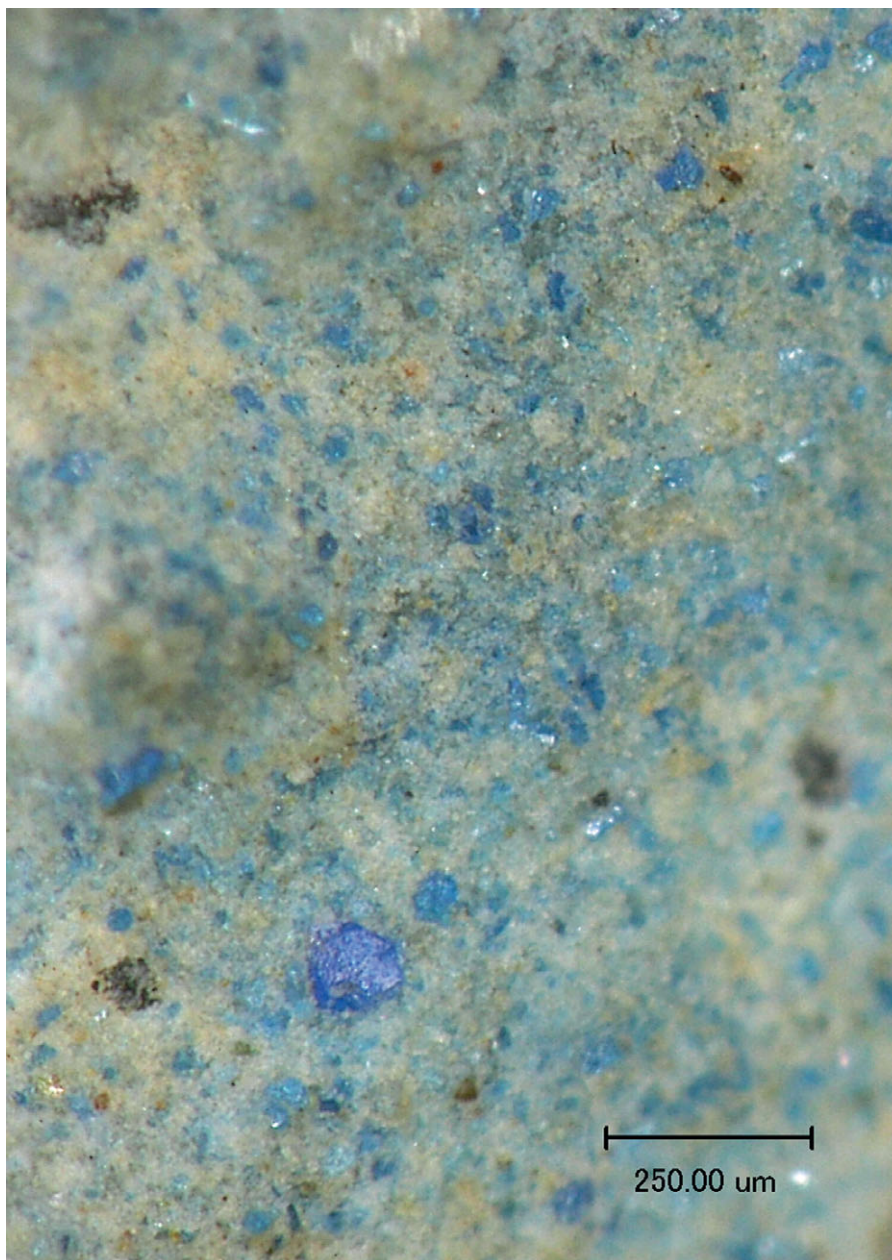
⁴¹ This fragment is today in the Metropolitan Museum of Art in New York City: Inv. No. 45.11.17. Richter 1946, 29, figure 26. Although it has been noted that the red paint is completely worn off today based on examination with the naked eye (Dusinberre 2005, 145–6 and figure 5), closer technologically assisted scrutiny is needed to confirm this statement.



3.6. Southern side of the Hall of 100 Columns: western doorway eastern jamb. Photo: Author

Washington, DC. In a sketchbook drawing, preserved in the same archive, he refers to the colors he observed on this particular fragment (**Figure 3.9**).⁴² We will return to a discussion of glazed materials as façade decoration on the Takht later.

⁴² National Museum of Asian Art, Smithsonian Institution, Washington, DC, Ernst Herzfeld Papers, Sk-IV Skizzenbuch Persien 1923 (1928).



3.7. Southern side of the Hall of 100 Columns: western doorway eastern jamb, north. Throne. Traces of blue paint, detail. Photomicrograph: M. Pamplona

Soon after the official excavations commenced on the Takht in early 1931, Herzfeld's letters and notes began referring frequently to color. From excavations in the so-called Harem, one of the building complexes on the southern side of the terrace, Herzfeld reported a ceramic bowl with a blue mass



3.8. Southern side of the Hall of 100 Columns: western doorway eastern jamb, north. Throne. Traces of red paint. Photo: Author

inside.⁴³ This bowl must have become part of the partage agreement. It was sent to Chicago, where it was duly accessioned, though it was not published by Schmidt. The records in the archive of the Institute for the Study of Ancient

⁴³ Entry in the find journal of April 1931 “Persepolis. Finds 1931”; Chicago, Institute for the Study of Ancient Cultures Archive: “no. 161: Find spot: Harem, Southern part, Western corridor.”



3.9. Fragment of a glazed brick, excavated by Ernst Herzfeld at Persepolis, Freer Study Collection, National Museum of Asian Art, Washington DC, FSC A 3d. Photo: National Museum of Asian Art, Smithsonian Institution

Cultures, especially a drawing by Herzfeld in the find journal leave no doubt that this is the very vessel to which Herzfeld was referring (**Figure 3.10**).⁴⁴

From unspecified parts of the same structure, Herzfeld listed ears of limestone bulls still covered with red paint, a large number of wall pegs of what was later referred to as Egyptian blue, and many fragments of glass paste in various colors. In the above mentioned letter to James Breasted dated November 5, 1932, Herzfeld notes a spectacular discovery in the Central Building (Tripylon):

I nearly forgot to mention that yesterday, during the uncovering of a door in the Tripylon the lower part of a relief was found, which portrays a king with sunshade and servants, in its original bright colors. I did not allow it to be uncovered entirely, in order to make preparations for a color drawing when the uncovering was complete. The most striking color is a luminous bright red for the ground of the king's garment and

⁴⁴ Chicago, Institute for the Study of Ancient Cultures Museum Inv. No. A 19384. The contents have not yet been analyzed: Nagel 2021b.



3.10. Bowl with paint residues, excavated by Herzfeld in the so-called Harem. Institute for the Study of Ancient Cultures Museum Chicago, Inv. No. A 19384

for the shoes. It is not cinnabar, rather a little orange in tone. I assume there was such a bright purple in antiquity: it is closest to the red of the robes of cardinals. With the color remains found everywhere on the sculptures which had been buried under the soil, I first thought that the reliefs essentially were the colors of the polished stone, i.e. black and only few parts, like ornaments, feather wings, lips, eyes, overlaid with red and bright blue, green, and yellow. *Now, it seems rather that all reliefs were entirely painted in brilliant, alternating colors, perhaps on the polished, black ground. What a strange impression this must have been!*⁴⁵

⁴⁵ "Ich hätte fast vergessen, dass gestern bei der Freilegung einer Tür im Tripylon der untere Teil des Reliefs, König unter Sonnenschirm mit Dienern, in seiner vollen ursprünglichen Farbenpracht zu Tage kam. Ich habe es noch nicht ganz freilegen lassen, um alles vorzubereiten, sofort bei der Freilegung eine bunte Aufnahme anfertigen zu können. Die hervorstechendste Farbe ist ein leuchtendes, helles Rot für den Grund des Gewandes und für die Schuhe, es ist nicht Zinnober, sondern ein wenig nach Orange hin spielend: ich bilde mir ein, dass es ein solches helles purpurrot im Altertum gegeben hat: am nächsten steht ihm wohl das Rot der Cardinalroben. Nach den Farbresten, die sich überall an den in der Erde begrabenen Skulpturen finden, hatte ich geglaubt, dass die Reliefs wesentlich die natürliche Farbe des polierten Steines, d.h. schwarz, gezeigt hätten und nur einige Teile, wie Schmuck, Flügel, Lippen, Augen mit rot und hellblau, grün und gelb aufgehöhht gewesen wären. Nun sieht es doch mehr aus, als seien die Reliefs so gut wie vollständig bemalt gewesen, in

Herzfeld was obviously rather taken aback by these original traces of paint detected by his workmen. Two weeks later, he sent a set of photographs to Chicago. In the accompanying notes he offers another interesting observation:

Herewith I attach some more photographs. . . . (2) Gate building [i.e. the Central Building, Tripylon], back (northern) door. Lower part of the figures of the king and servants with vivid colors (we made watercolor sketches). (3) The same hem of the robe of the king: besides the colors there was a layer of nearly 0.5mm gold."⁴⁶

Although these black and white photographs are preserved in the research archives of the Institute for the Study of Ancient Cultures, it is impossible to identify on them the position of the gold mentioned in the annotations. A watercolor of the same relief, prepared by Krefter, was published only a few months later in April 1933;⁴⁷ but no gold is indicated on it (**Figures 3.11 and 3.12**). Thus, Herzfeld's evidence is frustratingly ambiguous.

Contrary to the color scheme identified by Herzfeld in November 1932, Tilia later remarked that the traces of paint on the royal shoe on this door jamb of the Central Building were red, not blue.⁴⁸ Also, in 1986, the art historian Peter Calmeyer (1930–95), reexamined the door jambs of the Central Building and claimed to have identified red *and* blue paints on the shoes of the king.⁴⁹ Subsequently, Friedrich Krefter, the only staff member of the excavation team still living, corrected Calmeyer, claiming that he saw *blue*, not red (and thus certainly also not blue *and* red) on the shoes when excavating the lower parts of this particular relief in 1932 with Herzfeld:

When I was excavating the base . . . and the color remains appeared, I immediately called Ernst Herzfeld. One should not argue some 45 years later, that I would not be able to distinguish between blue and red shoes . . . Fact is, the king wore red stockings. . . . Paint splatters from

leuchtenden, gegensätzlichen Farben, vielleicht vor dem polierten, schwarzen Grund. Was für ein seltsamer Eindruck muss das gewesen sein!" (trans. mine). Herzfeld, letter to James H. Breasted, November 5, 1932, Institute for the Study of Ancient Cultures Chicago, Archives.

⁴⁶ "Ich lege hiermit noch einige Fotos bei: 1. Der Thorbau von Süden: die Arbeiter finden gerade die neue Treppe im Norden. 2. Thorbau, die hintere (Nördliche Tür). Untere Teile der Figuren des Königs und der Diener mit lebhaften Farben (Wir haben davon Aquarelle gemacht), 3. Desgleichen, Kante vom Gewand des Königs: ausser den Farben war fast 0.5mm starkes Gold aufgelegt." Herzfeld, Letter to James Breasted, November 19, 1932, 5. Institute for the Study of Ancient Cultures Archives.

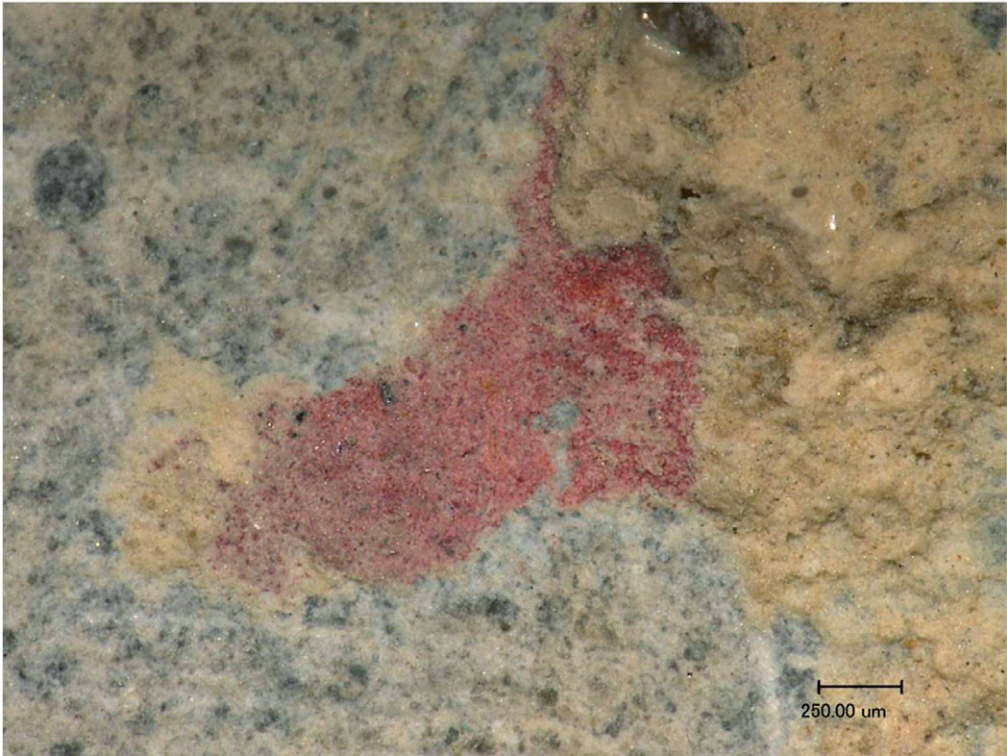
⁴⁷ Herzfeld 1933, 488, republished in Krefter 1989, plate 1.

⁴⁸ "The blue color indicated by Herzfeld on the king's shoes must have been a mistake, since we found clear traces of red on them." (Tilia 1978, 56–7).

⁴⁹ Calmeyer 1989, 133.



3.111. Tripylon, north, eastern door jamb, detail. Drawing by F. Krefter, published in Herzfeld 1933: 488, republished Krefter 1989, plate 1



3.12. Tripylon, north, eastern door jamb, detail. Photomicrograph: M. Pamplona

the blue mantle. It is a fact that the shoes ... when I excavated them personally on the western door jamb of the door of the Tripylon, were blue.⁵⁰

In support of his claim for seeing both red and blue on the royal shoes in Persepolis, Calmeyer referred to the observations by Flandin regarding the shoes on a relief of the Neo-Assyrian king Sargon II at Dur Sharrukin, which were striped in red and blue.⁵¹ This interesting historical comparison lends credence to Calmeyer's observation. To further complicate the evidence of paint on depicted shoes, a glance at an early reconstruction of the façade of the glazed brick guards from Susa makes it evident that even at Susa the colors of

⁵⁰ Krefter 1991, 57–9: “Als ich am 22.2.1933 den Sockel des Rückgewändes ausgrub und die Farbreste ans Tageslicht kamen, habe ich sofort Ernst Herzfeld hinzugerufen. Man sollte 45 Jahre später nicht behaupten, wir hätten blaue und rote Schuhe nicht auseinanderhalten können. ... Feststeht, dass der König rote Strümpfe trug. Farbspritzer blau vom Mantel ... Jedenfalls waren die Schuhe ... in der westlichen Türleibung der Tür des Tripylon, als sie am 22. Februar 1933 von mir persönlich ausgegraben wurden, in ihrem Farbanstrich blau” (trans. mine).

⁵¹ Botta and Flandin 1846, vol. I: plate 14; Calmeyer 1989, 133.

the shoes as depicted differ.⁵² The fact remains that we are left with the bewildering puzzle of two divergent witnesses, as no scientific analysis was conducted, nor were any detailed color photographs or scientific documentation ever published.

As already mentioned, Herzfeld's important observations regarding the original surface decoration and the gilding of stone surfaces were only partially included in the final excavation reports, in which pigments on stone remains are mentioned only in passing and in the most brief and matter-of-fact manner.⁵³ Although many of the observations Herzfeld made on the colors on the monuments on the Takht during his directorship went unpublished even by Herzfeld himself, he did allude to *some* of his discoveries in print. He remarked, for instance, that "the excavations of the covered parts of the sculptures of the Tripylon also revealed their original colors unchanged: purple red and turquoise blue, with application of metal, possibly gold."⁵⁴

A CASE STUDY FROM THE HALL OF 100 COLUMNS: THE FIGURE IN THE WINGED DISK

Let us examine in some detail the case of the relief of the figure in the winged disk that was originally hovering above the image of the king on four door jambs on the south side of the Hall of 100 Columns (**Figures 3.13–3.15**).

In addition to the aforementioned references to the original surface appearance he observed in the Hall of 100 Columns in December 1923, Herzfeld drew the wing of a figure in the winged disk in a sketchbook and noted "excavated with fresh colors in front of the eastern door on the south side of the Hall of 100 Columns."⁵⁵ At some later date he added the following annotation on the same sketchbook page: "1931 re-found, completely destroyed, dealers broke out the figure of Ahuramazda."⁵⁶ Working from a second watercolor of the same relief, of unknown date and unknown hand (perhaps Herzfeld's own), Herzfeld reconstructed the colors of this relief in vivid detail, noting that the background was black, while the colors stood out like "cloisonné enamel" (**Figure 3.16**).⁵⁷

⁵² Dieulafoy 1893, plates VI–VII; Chevalier 2013, 65, figure 44. The dark skinned "Susa" contingent is depicted with blue shoes and the white skinned "Persia" contingent is depicted in yellow shoes.

⁵³ E.g. Schmidt 1953, 82, n. 90; 116; 134, n. 53; 257. ⁵⁴ Herzfeld 1941, 255.

⁵⁵ National Museum of Asian Art, Archives, Smithsonian Institution, Washington, DC, Ernst Herzfeld Papers, Sk-IV Skizzenbuch Persien 1923, 2: "Vor der östlichen Thür der Südseite des 100 Säulensaales mit ganz frischen Farben ausgegraben" (trans. mine).

⁵⁶ Ibid.: "1931 vollkommen zerstört gefunden, von Händlern die kleine Ahuramazda Figur herausgemeißelt" (trans. mine).

⁵⁷ Herzfeld 1941, 255; there plate LXIV in black and white.



3.13. Figure in winged disk, Hall of 100 Columns, south, western doorway, eastern door jamb in situ, 2007. Photo: Author

Confirming what we know about the original background colors of the sculpted reliefs at Persepolis is of great interest. Texier had observed a blue background. An Achaemenid Persian mural fragment from Susa, preserved today in the Museum of Haft Tepe, shows the figure set out against a blue ground. A blue background is considered by some to be the standard practice in Greek relief sculpture of the same approximate period and has



3.14. Figure in winged disk, Hall of 100 Columns, south, eastern doorway, eastern door jamb in situ, 2007. Photo: Author

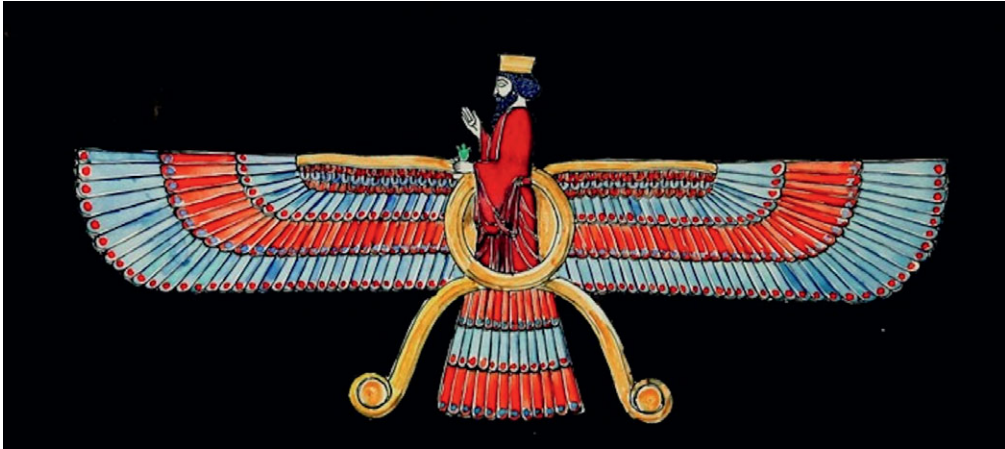
been noted on other western Asian relief sculptures, too. As we attempt to reconstruct various alternative scenarios to account for certain discrepancies, we appreciate that Herzfeld's statements need to be treated with caution. First of all, the relief in question cannot have been "excavated" in 1923, because it was visible in 1892, when a mold was taken by an English/Italian team that had joined the expedition of Weld-Blundell on



3.15. Figure in winged disk, originally from Hall of 100 Columns, south, eastern doorway, western door jamb. Fogg Museum of Art, Harvard University Art Museums, Cambridge, 1943.1062. © Harvard University

the site.⁵⁸ The relief had always remained on the site. However, the Italian restoration team headed by Giuseppe Tilia in collaboration with his wife, the art historian Ann Britt Tilia, put it back in its original architectural placement in 1973. Tilia found it indeed doubtful that Herzfeld saw any

⁵⁸ Curtis 2000, 47, figure 54; Smith 1932b, plate 1; see Chapter 5.



3.16. Watercolor of figure in winged disk, prepared by Ernst Herzfeld (?). Herzfeld Archives, National Museum of Asian Art, Washington DC, D 0904

traces of pigments on this particular relief. The evidentiary value of this specific watercolor is highly suspect unless it predates Herzfeld's excavations and refers to a relief today at the Harvard Art Museum on which a number of traces of paint have been preserved and documented.⁵⁹

There is, indeed, a better chance of reconstructing the polychromy of this composition, if we turn to the other reliefs depicting the same motif of the figure in the winged disk. Three such figures, all hovering originally over the enthroned king, and facing the interior of the hall in the southern door jambs, are preserved in situ. Of these three additional examples, two (like the one Herzfeld claims to have rendered in his watercolor) were returned to their original architectural positions by the Italian restoration team in the early 1970s.⁶⁰ The fourth, removed from the site, is the one today in the Harvard Art Museum collection. Originally mirroring each other, each of the four reliefs on these door jambs preserves characteristic features allowing us to make some interesting statements about the complex entanglements between sculptors and painters working on the south side of the Hall of 100 Columns. The relief fragments lead us into discussions on specific characteristics of polychromy in the context of the stone carving on the site: certain details suggest that some parts of the reliefs that were not rendered by carving were painted on instead. Examining the reliefs, it is striking what is missing and what is

⁵⁹ Tilia 1978, 42. Harvard Museum 1943.1062. Eremin and Kandhekar 2008. The relief fragment entered the private collection of the U.S. art collector Grenville Winthrop (1864–1943). It was acquired by the Harvard University Art Museums after his death where it is today part of the Arthur M. Sackler Museum, Harvard University Art Museums.

⁶⁰ Tilia 1972, 51, figure 109, plate XLIX; Tilia 1978, figures 18–24, plates XXIV–XXVI; figure 29, plate XXIX.

there. The eastern relief in the western doorway preserves the most detailed carving. Incised outlines of the feathers inside the ring and details of the flower held in the hand of the figure prove that this relief was perhaps the one relief considered to be nearly “finished” by the carver. Both the eastern and western reliefs in the eastern doorway, however, lack many details. The eastern relief of the eastern doorway in situ lacks detailed carving in the ring, but it does show the curls in the figure’s hair. The western relief in the same doorway (in Harvard), by contrast, lacks carved details in the ring, beard, and hair. The missing details in each instance were therefore probably supplied in paint.⁶¹ Within one set of relief sculptures, the whole range of possibilities can be identified.

Judith Lerner worked as an independent researcher at Persepolis at various points between 1969 and 1975 (thus overlapping with the era of the Tilias’ restorations and investigations on the site). Lerner had previously extensively studied the surface of the door jamb relief fragment in Harvard.⁶² She was the first to actually observe and document the remains of pigments preserved on the Persepolis figure in the winged disk in the Harvard collection. Based on a detailed documentation, Lerner proposed a color reconstruction.⁶³ Lerner’s reconstruction was contested, however, in some of its aspects by Tilia. The traces of the paints still preserved on the matching segments of the same relief that remained in situ in Persepolis were documented by Tilia as follows:

on the first row of feathers from the bottom there were plenty of green pigments, and . . . the circular areas on the tips of the feathers showed traces of scarlet red color. The second row of feathers, on the other hand, showed numerous traces of red color, whereas the circles on the tips of the feathers had been painted blue.⁶⁴

Tilia proposed a new reconstruction.⁶⁵ None of the surface paints identified in the small feathers at the top of the wings by Lerner on the relief at Harvard were found in the fragments in Persepolis, while the one in Harvard reveals evidence of alternating red and blue rows. The paint motif of the feathers

⁶¹ The uppermost part with the winged figure was taken down during the conservation/restoration program by Tilia in the 1970s: Tilia 1978, 36. After it was examined for paint remnants it was put back in its original position.

⁶² Lerner 1971. ⁶³ Lerner 1971, 23, figures 9–10; Lerner 1973, 120–1.

⁶⁴ Tilia 1978, 33; cp. *ibid.*, figure 1a.

⁶⁵ It was Giuseppe Tilia and his studio TREERRE with illustrator Franco Trasatti who proposed a new color reconstruction of the winged figure, one of two new color reconstructions (Tilia 1978, 1995; Tilia and Callieri 2001). The documents of Tilia’s activities on the site are today in Rome. Among the documents is also an earlier colored draft of a winged figure from the door jambs in the Tripylon. ISiAO, formerly Archive of ISMEO, Rome, Drawings, Inv. No. 4879.



3.17. Fragment of a lion's face, National Museum, Tehran, Inv. No. 1202. Photo: Author

inside of the ring from which the figure is emerging continues the lines of the carved elements of the relief.⁶⁶

An important feature of all the winged figures' feathers on the door jambs is the set of incised circles on the tips. A drawing in the Persepolis Find Processing Book from 1932 shows a "fragment with tips of wings, painted with red dots."⁶⁷ This fragment seems to have been excavated in the Tripylon. These circles had therefore been observed by Herzfeld and were studied by both Lerner and Tilia. The latter commented on a whitish substance along the edges, which is also seen on the small feathers on the top of the wings.⁶⁸ Tilia observed that the outside

of these framings show a high degree of corrosion and argued that "a special color had been used for a special foundation, which had had a corroding effect on the stone, and possibly one that was meant to imitate a metal, perhaps gold."⁶⁹

No chemical analysis has yet been conducted on these whitish substances. In photographs taken in the early 1970s of the reliefs on both door jambs of the western doorway, the edge of the feathers still showed a whitish substance that is mostly gone today. It has to be noted, though, that a very similar whitish substance remains visible on some other sculptures from Persepolis in contexts where it is rather doubtful that an appearance of metal was meant to be achieved. This is the case, for instance, with the whitish substance I observed in 2007 on the eyeball of a lion capital fragment from Persepolis. This fragment is now in the storerooms of the National Museum in Tehran, Inv. No. 1202 (**Figure 3.17**). It is more plausible in this instance certainly that the whitish substance is a vestige of a white colorant intended to be read as the color white.

Recently, a micro-sample was taken from the whitish spots on the small feathers on the top of the wings from the jamb fragment in Harvard.⁷⁰ The elements found on these indicate that a hydrated iron oxide was used, perhaps indicating a yellow. Such yellow may have been a ground-layer for gilding, but without any further investigation and analysis on the reliefs in situ, Tilia's

⁶⁶ Tilia 1978, 36.

⁶⁷ Chicago, Institute for the Study of Ancient Cultures Museum Archives. Persepolis Find Registration Book, no. 882.

⁶⁸ Tilia 1978, plate 26, figures 22–4.

⁶⁹ Tilia 1978, 36.

⁷⁰ Eremin and Kandhekar 2008.

proposed gold reconstruction must remain hypothetical.⁷¹ The dress of the figure in the winged disk on the Harvard fragment as seen through microscopic research reveals it to have been originally incised with patterns for an abundance of ornaments meant to be added in color.⁷²

Golden appliques may have been indicated on the dress in added paint, based on comparison with those depicted on garments of some honor guards on glazed brick reliefs from Susa as well as on later images depicting an Achaemenid ruler.⁷³ Scientifically documented archaeological finds from within Fars and other parts of the empire as well as ancient texts support the idea that the actual Elamite and Achaemenid dress was rich with gold applications.⁷⁴ The holes on the pleats of the garment and on the shoes of king Cyrus on the surviving sculpted limestone reliefs (only the bottom parts are preserved) on the door jambs of Palace P, the “residential palace” at Pasargadae, were intended to keep metal attachments in place.⁷⁵

There has been much recent interest in and attention to garments as attested in the archaeological record, preserved textiles, and depictions of them.⁷⁶ Ancient gold bracteates were excavated by Herzfeld at Persepolis.⁷⁷ Fragments of textiles with embroidered rosettes and gold bracteates were found in the Sanjan Tomb.⁷⁸ It is obvious that only members of the elite could wear such elaborate garments.⁷⁹ The recently excavated fourth-century BCE dress ornaments from burials at Vani in western Georgia and new finds from southern Siberia add to already abundant evidence demonstrating the widespread use of such lavish polychrome garments among elites also on the periphery of the Achaemenid Persian Empire.⁸⁰

⁷¹ During recent investigations of a marble statue, c. 520 BCE, from Attica elements of gold foil were identified. They are technically analogous to the gold foil features hypothesized on the figures in the winged disk from the door jambs of the southern doors of the Hall of 100 Columns (Brinkmann and Koch-Brinkmann 2020).

⁷² These new findings are currently being studied by S. Ebbinghaus and K. Eremin.

⁷³ E.g. the details on the border of the garment of Darius III in the so-called Alexander Mosaic, c. 100 BCE, from Pompeii: Cohen 1997; Hase 2009, 66, figure 4, 71 figure 5. Stars appear earlier on the dress of Thetis on the relief from the Siphnian Treasury at Delphi in Greece (c. 525 BCE): Brinkmann 2008, 87 is not clear whether this was gold foil. Gage (1993, 25) remarks on the remnants of purple cloth with golden star medallions preserved in the Tomb of Phillip II at Vergina. Many prestige elements in the iconography of art at the Macedonian court of Phillip were emulating the arts of the Achaemenid Persian court.

⁷⁴ Gleba 2008, 61. ⁷⁵ Root 1979, 51–2 and plates II–III; Tilia 1968, figure 15.

⁷⁶ Alvarez-Mon 2009b; Gaspa 2014; Paetz 2009; Palme and Zdiarsky 2012; Villard 2010; In the context of Persepolis, see now McFerrin 2017 and Balatti 2019.

⁷⁷ Schmidt 1957, 72; Persepolis Find Procession Book, Chicago, Institute for the Study of Ancient Cultures Museum.

⁷⁸ Alvarez-Mon 2010, plates 11–3; see also the important observations made earlier by Bovon 1963; Linders 1984; and Oppenheim 1949. Now Shishegar 2017.

⁷⁹ Kantor 1957.

⁸⁰ Kacharava and Kvirkelia 2009, esp. 288–92, grave no. 24, figure 47; Polosmak 2001.

THE ROYAL THRONE: FURTHER OBSERVATIONS ON THE RELIEFS OF THE HALL OF 100 COLUMNS

Ann Britt Tilia states that Egyptian blue covered the molding of the very bottom of the throne leg on the eastern door jamb, western doorway, southern side of the Hall of 100 Columns.⁸¹ Here we must be aware that she is using the technical term “Egyptian blue” (which should have been reserved for a description of a particular mineral substance) simply to describe a blue hue.⁸² Both Tilia and Lerner independently noticed that one can also observe alternating layers of red paint (ochre?) as well as tiny remnants of blue, on a throne leg of another of these reliefs on the south side of the Hall of 100 Columns. Lerner suggested multiple possible color reconstructions here, though these have not been published to date.⁸³ Tilia, however, reconstructed a version, apparently of the same area, that differs from any of the reconstructions proposed by Lerner: Tilia concluded that the vertical ridges of the throne’s bell shaped leg elements “must have been painted red and blue.”⁸⁴ It is likely that the red ochre served as ground layer for a second layer (gold?). Indeed, fine, incised lines along the inner corners of these ridges showed a whitish substance. Tilia herself suggested that this may be an employment of gold over the red.⁸⁵

In 1975, Lerner was given authority to remove samples of paint for further analysis from the stone relief on the western door jamb, western doorway, of the southern wall, and other features of the Hall of 100 Columns (Figure 3.18). She noted at the time that some of the blue pigments came away as thin and flaky, easily coming off the smooth, polished surface of the stone.⁸⁶ Based on personal observations made on the door jamb’s royal throne during various times of the day, beginning early in the morning, Lerner stated that “it is very difficult to distinguish blue from green.”⁸⁷ The same had been stated by Tilia.⁸⁸

COLUMNS

Reconstructing the original appearance of the columns in the many halls on and in the buildings below the Takht, and the appearance of the columns at Susa and other sites within the heart of the empire, remains a challenge. On the Takht at Persepolis, stone columns with elaborately carved bases and

⁸¹ Tilia 1978, 43, figure 2b.

⁸² Skovmøller et al. 2016. On linguistic aspects and implications of Egyptian blue Egyptians referred to as *hsbd iryt* (“artificial lapis lazuli”): Delamare 2013; Tudeau 2019, 112 n. 51.

⁸³ I am grateful to Dr. Judith Lerner for sharing these with me.

⁸⁴ Tilia 1978, 43, figure 2a.

⁸⁵ Tilia 1978, 44. ⁸⁶ Lerner, unpublished log, 3, sample 12.

⁸⁷ Lerner, unpublished log, 4. ⁸⁸ Tilia 1978, 44, n. 1.



3.18. Workman at Persepolis with blue pellet after excavation, 1975 (cp. Fig. 3.22). Photo: Judith Lerner

capitals were used in the Apadana, the Hall of 100 Columns, the Gate of All Lands, the Palace of Xerxes, and the Central Building.⁸⁹ Wooden columns set atop stone bases were used elsewhere, for instance in the so-called Harem, the Treasury (more than 300 columns), the Hall of 32 Columns, and the chambers in what is generally labeled as the Garrison quarters, as well as in some areas of the Palace of Darius, and in the palaces immediately below the Takht.⁹⁰

Scholars have argued that individual design elements of these columns reflected creative reworking of Egyptian and Ionian formal traditions. Thus it is highly likely that the Persepolis columns, and the similar ones at Susa and elsewhere at imperial centers, were elaborately adorned in ways that relate to traditions of architectural polychromy embellishment known from western Anatolia, Egypt, and the Mediterranean. Already in the nineteenth century, it seems that the remarks we encounter for the original aesthetic appearance of the columns in Achaemenid Persia were influenced strongly by ideas current at the time concerning Greek architectural adornment. Evidence in the temples along the western reaches of the Achaemenid Persian Empire could be of relevance for the reconstruction of columns at the imperial centers. The columns and column bases of the colossal temples in Ionia (e.g. Ephesus,

⁸⁹ Krefter 1971, 37; Schmidt 1953, 112, 241.

⁹⁰ Krefter 1971, 27, 35 “Küchen-Trakt”; Trümpelmann 1988, 42.

Didyma, Priene, Sardis, Magnesia) spring to mind, although it is hard to estimate their original appearance at this point.⁹¹ Here, we must distinguish between the polychrome characters of the individual column parts, column capitals, bases, and the actual columns. On the volute of an archaic column capital of the temple of Artemis at Ephesus, for instance, archaeologists noted a channel between two astragal moldings covered with lead and gold leaf.⁹² Of particular note is evidence from the fourth-century BCE Tomb of the satrap Mausolus (the Mausoleum) of Halicarnassus.⁹³ Here, a leaf ornament of a column capital retains copious traces of blue pigment until today. The nineteenth-century excavator of the Mausoleum, Newton, observed that the column *shafts* were painted along with many other elements, too.⁹⁴ Unfortunately, this evidence described by Newton is no longer visible, and recently, Newton's original observations have been viewed with skepticism.⁹⁵ It has apparently seemed more plausible to Jenkins et al. that a varnish had been applied to the [unadorned?] column shafts in the Mausoleum "producing a white reaction layer." But it is unclear on what basis the new rejection of Newton's observations has been made. The Mausoleum, with its idiosyncratic architectural form and lavish sculptural decoration, occupies a complicated place in discourses on artistic production and cultural meaning in the ancient world. For many, it stands as an iconic monument in the textbook repertoire of classical Greek art. Classical texts name the sculptors of the relief sculptures of this monument as Greek.⁹⁶ Yet it cannot be denied that it is in fact a tomb commissioned by a satrapal court of the Achaemenid Persian Empire, surely speaking to a lively creative patronage agenda.

Returning specifically to evidence for polychromy on stone columns, there is testimony from mainland Greece during the classical age. In the mid-nineteenth century, the French architect Alexis Paccard (1813–67) noted a

⁹¹ Dirschedl 2011, 470–1. For renewed work on previous polychromies on the architecture of the Temple of Artemis Leukophryene at Magnesia, see Taschner and Zink 2016.

⁹² Jenkins et al. 1997, 38, plate 14, figure 34. For some general remarks on polychromy in ancient Greek temple architecture, see Hellmann 2014; Neils 2016. Orlandos (1978, 645) argued that the meander pattern on the architrave of the Parthenon may have been gilded against a red background. This enhances the vision of a vividly polychrome Parthenon in areas of the structure closely associated with the columns themselves. On sixth-century BCE painted marble roofs in Greece: Ohnesorg 1991.

⁹³ The fourth-century BCE Tomb of Uza Ova at modern Milas, ancient Mylasa, preserves abundant traces of polychromy too. I am grateful to P. Briant, who provided further information about the tomb's original decoration, which remains unpublished.

⁹⁴ Jenkins et al. 1997, 36 and col. plates 6–7; 39, quotation from an original letter of Newton in 1857: "The columns, their bases and capitals, were all coloured, so were the cornice, frieze and subordinate architectural mouldings. . . . It would be rather important to examine which parts were not coloured, so universally do traces of colour appear."

⁹⁵ Ibid. ⁹⁶ Cook et al. 2005, 17–28.

yellow ochre cover on columns of the Parthenon.⁹⁷ Turning to evidence from Susa, de Mecquenem remarked that the column flutings appeared to have a yellowish tone, suggesting that they were originally covered with gilding.⁹⁸ An early column base from the Athenian Agora preserved traces of green and red.⁹⁹ Although Marie-Christine Hellmann (1950–2017) and other colleagues have addressed aspects of polychromy and gilding in ancient Greek temple architecture, more research and analysis is needed to provide a comprehensive picture.¹⁰⁰

It is widely known, however, that the columns of the monuments of ancient Egypt were brightly decorated. During the New Kingdom, Egyptian stone columns were in many cases covered with a gesso (a mixture of whiting and glue) and painted afterwards, sometimes inlaid with faience tiles. It has been argued that such surface decor often aimed at imitating other materials – marble or even gold.¹⁰¹

Evidence from other ancient sites from later periods offers abundant comparanda. As for the original appearance of columns in Seleucid, Parthian, Sasanian, and subsequent cultures, some work has been done in recent years, and it is evident that columns in the Islamic world were painted and otherwise decorated.¹⁰² Individual columns in the Great Temple at Nabataen Petra had their own distinctive color schemes. While the columns at the northern side entrance of the Great Temple were covered with a plaster coating painted in red, the columns on the other sides alternated between red and yellow with some highly polished surfaces indicating that the polish was meant to resemble marble in the imitation of more expensive materials. When the *pronaos* columns were excavated, they were found to have been covered with remains of red plaster, while the columns in the temple were covered with plaster and stucco, which had a different decoration in the lower and upper parts.¹⁰³

More data emerge from Persepolis. These are, however, limited to the original decoration of wooden columns. During Schmidt's excavations in the Treasury, painted gypsum plaster fragments, some 8 to 10 cm in thickness with reed impressions on the back, that had once adorned interior wooden columns

⁹⁷ Blümner 1912, vol. III: 169; Burnouf 1847, 847; Paccard 1982.

⁹⁸ De Mecquenem 1947, 38. ⁹⁹ Dirschedl 2011, 470, plate 26.

¹⁰⁰ Hellmann 2014; Zambon 2012. See also Brinkmann et al. 2017, 115 no. 23; Shaer (2003, 128, figure 25) documented gold leaf on stuccos excavated at the Temple of Winged Lions in Petra.

¹⁰¹ Phillips 2002, 291.

¹⁰² E.g. Bush 2011, 58, figure 43. Such column polychromy is also evident in the mosque of Musa at Sanaa in Yemen: Antonini 2012, 81, figure 170.

¹⁰³ Dentzer-Feydy 2019; Shaer 2003, 111–3. Progress has been made recently in understanding the composition of pigments and polychromies in modern Jordan and Syria. See, e.g. Blume-Jung 2021 (Palmyra, Roman period); Brøns 2020; Brøns et al. 2022; Buisson et al. 2015.

were excavated close to some column bases in Halls 38 and 41, and carefully documented.¹⁰⁴ The reconstruction by Haines labels the color scheme pattern in red, white, and blue in “an intricate pattern of interlocking lozenges elaborated with paired scrolls.”¹⁰⁵ To my knowledge, these pigments have never been tested in any way, and their present location is unknown. It has been argued that the wooden columns in the central hall of the Red Building at Parthian Nisa in modern Turkmenistan originally had a plaster coat with painted decoration similar to what has been reconstructed for the Persepolis Treasury on the basis of the material evidence presented by Schmidt. At Nisa, the half columns from the Square Hall had colored capitals, too. Traces of red paint have been identified on the column bases and the column shafts.¹⁰⁶

Krefter suggested that pieces of dark and white onyx (so-called eye stones) that were excavated in the Treasury at Persepolis may have originally belonged to wooden column capitals that crowned the wooden columns, since a number of these eyestones were also found in the so-called Harem, where wooden columns existed, too.¹⁰⁷

In excavations south of the platform between 1969 and 1972, Akbar Tajvidi discovered a stone column base with a plastered wooden column shaft, but did not comment on the color schemes identified.¹⁰⁸ During excavations in the Shaour Palace at Susa, the excavators noted abundant traces of blue paint and argued that the paints originally covered wooden column shafts in the hall. Sherds used as palettes were recovered, too (**Figure 3.19**).¹⁰⁹ A similar treatment with blue paints can be deduced for a column excavated at Qal-e Kali, halfway between Persepolis and Susa. Significantly, a potsherd encrusted with blue pigments was excavated in front of one column base here (**Figure 3.20**).¹¹⁰

There is evidence for the decoration of the Persepolitan stone column capitals above the flutings. In 1969, Giuseppe Tilia reported fragments of limestone composite capitals. He found fragments of a bull’s nose with bright red color in its nostrils, two fragments of eyes with red paint, and a small fragment of one of the bull’s eyes with traces of blue on the eyelid at the foot of the southwest corner terrace wall below the so-called Palace H.¹¹¹ An unpublished fragment of a stone lion’s paw with remnants of blue paint excavated on the Takht, today in the Institute for the Study of Ancient

¹⁰⁴ Schmidt 1953, 145 and figure 72J; Schmidt 1953, 160–1; see color reconstruction by Tilia in Shahbazi 2004, 190, figure 153.

¹⁰⁵ Schmidt 1953, 160. ¹⁰⁶ Lippolis 2009, 556–8.

¹⁰⁷ Krefter 1971, 35; Schmidt 1957, plate 44.

¹⁰⁸ Potts, Roustaei, et al. 2009, 220, figure 11.; Tajvidi 1976, 185.

¹⁰⁹ Boucharlat 2013; Nagel 2018a.

¹¹⁰ This building complex may have served to accommodate those who traveled between the two heartland capitals along the Royal Road: Potts, Roustaei, et al. 2009. I am grateful to D. Potts who kindly facilitated access to the materials.

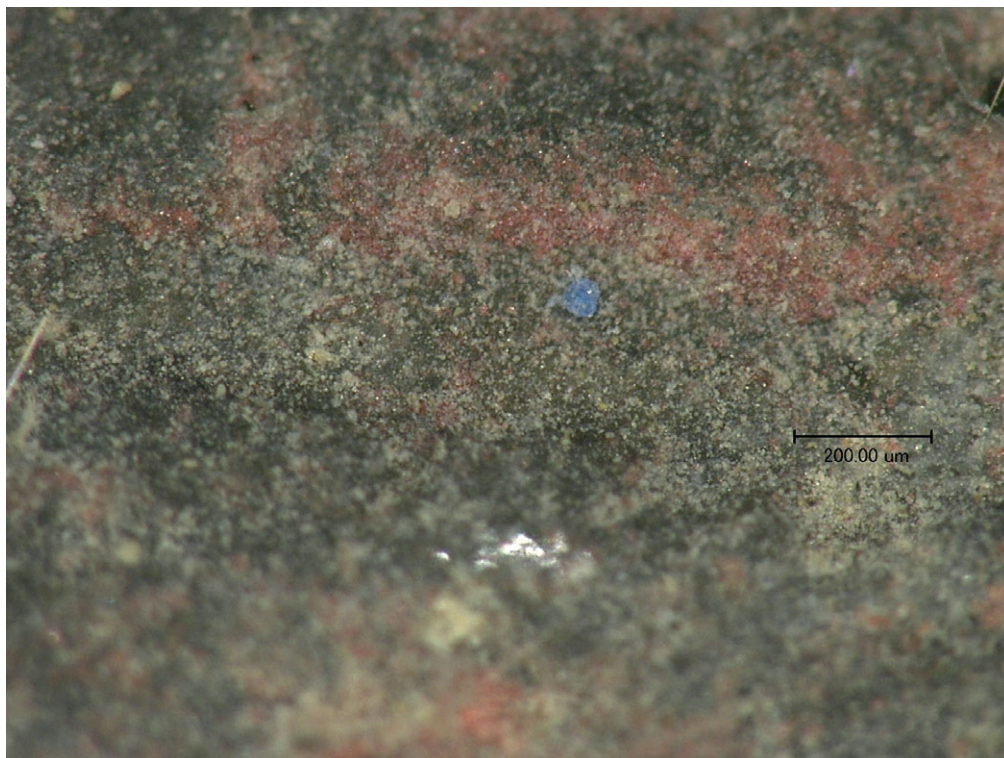
¹¹¹ Tilia 1972, 244 n. 3 and 245 with further references, figure 22.



3.19. Sherds, encrusted with pigments, excavated at the Shaur Palace in Susa. Photo: Remy Boucharlat



3.20. Sherd, encrusted with Egyptian blue pigments, excavated at Qal-e Kali. Photo: Dan Potts.



3.21. Micrographic photo from the surface of a fragment of an ear of animal protome, excavated on the Takht. Persepolis Museum, Inv. No. 303. Photo: M. Pamplona

Cultures Museum in Chicago, provides additional evidence that blue was often used rather often to paint the stone sculptures. Schmidt had earlier identified traces of blue paint on the bull capitals represented on the palatial façade depicted in relief on the façade of the Tomb of Darius I (see below).

It is generally understood that the renderings on the royal tomb façades depict a faithful vision of actual palace architecture of the time. Among the finds belonging to one or more of the buildings in the southern part of the terrace were column capital elements including addorsed bull protomes with small bored holes around the eyes, on the eyebrows, and on the curls of the hair. These holes originally held metal ornaments.¹¹² Traces of blue paint are preserved on ears belonging to such column capital protomes (**Figure 3.21**).

Today we know that earlier generations of restorers of columns in the fourteenth-century Alhambra in Spain mistook traces of gold leaf on the surface for accumulated dirt, whitening therefore traces of original polychromy.¹¹³ In hindsight, it is striking that in the nineteenth century, when academics barely began to study the arts of Achaemenid Persia, scholars began

¹¹² Tilia 1974, 241; 1978, 68 and figure 55.

¹¹³ Bush 2011, 58; 2021, 21.

to dissect pre-Islamic art from Islamic art. Today, these nonexistent dialogues and missed narratives reflect missed opportunities that future research should be able to resolve.

OTHER FEATURES OF ARCHITECTURAL AND SCULPTURAL POLYCHROMY IN PERSEPOLIS

At some point during the heydays of Persepolis, two central panels originally flanking the Apadana's northern and eastern façades were moved to an open courtyard of the Treasury at Persepolis.¹¹⁴ The rosettes carved on the frames of these repositioned central panels were echoed in painted equivalents on the framing borders of the doorways in the very same courtyard.¹¹⁵ Although the actual material evidence seems to have been destroyed shortly thereafter, a description of a six-phase application on these framing borders was determined:¹¹⁶

1. A solid band of blue was applied onto a greenish-gray wall surface.
2. The outline of a narrower band was sketched on the blue base in a reddish or neutral tone.
3. A white coat with irregular edges was applied thickly over the narrow strip outlined in the second phase.
4. The irregularities of the white band were corrected and straightened by applying more blue on top of the white along the edges.
5. The rosettes and bordering triangles were sketched freehand with a small brush on the white band in neutral tone.
6. Blue and red paints were applied to the design stage of the fifth phase.

As these framing borders are not preserved any longer, it is impossible to verify this sequence of application or even to understand the evidence upon which the information was supplied.

Ali Sami reported on important discoveries made "below the platform of Persepolis" in 1951. He noted that

in the course of removing earth pieces of coloured flowers, which decorated the roof and walls of the rooms in red, blue and white were found, and it is plain that, after plastering, the rooms were adorned with various designs of flowers and leaves in fast and beautiful colours, but since these designs were carried out in plaster, which has remained under the soil, damp has disintegrated it, and we were not able to find a single

¹¹⁴ "Courtyard 17": Schmidt 1953, 162–70; Tilia 1972, 175–98. They were likely removed from the Apadana during the reign of Artaxerxes II.

¹¹⁵ Schmidt 1953, 160 and figure 68B. ¹¹⁶ Schmidt 1953, 160.

sound piece. The floor of the hall was spread with the same red plaster as we have described in other buildings above.¹¹⁷

THE PIGMENT BOWLS FROM THE APADANA

The Apadana was the landmark building on the terrace platform ever since its construction began in the late sixth century BCE.¹¹⁸ Measuring some 110 m in length on each side, with thirty-six monumental stone columns supporting a central hall, and another thirty-six monumental stone columns on three sides, as well as a group of storerooms between the two southern towers, this building was a colossal enterprise in many respects. In the corners of the building, stairways once led to upper mezzanines and floors. They made the entire monument one of the largest single building enterprises ever constructed in the first millennium BCE ancient western Asia. The building dominated the entire terrace complex.

The lower parts of the staircases on the north and east façades are still adorned with the famous reliefs of gift-bearers from the subject lands paying homage to the Great King.¹¹⁹ While Herzfeld and Schmidt had cleared the front of the Apadana according to their objectives, it was only in the 1970s that surprising evidence was discovered during probings below the level of the façades. When removing the lower parts of the inner western flight of the northern stairway in order to repair them in the spring of 1978, Tilia noted lumps of green, red, and blue paint spread over an area some 2.50 m long and 60 cm wide, some 26 cm below the bottom of the rosette border. The workers found potsherds with pigments of the same color encrusted on them.¹²⁰ In 2004 and later, further sherds encrusted with red and blue pigments were

¹¹⁷ Sami 1955, 59.

¹¹⁸ For a general description see Krefter 1971, 45–54; Root 1979, 86–95; Schmidt 1953, 70–106, 162–9 and plates 15–61; Tilia 1972, 125–208. The foundations for this massive enterprise, the most imposing and thick walled Persepolis hypostyle hall were laid by c. 515 BCE (Root 1988, 2010). The foundation deposits under the building included a stater from Aegina, a tetradrachm and croeseids from Abdera, and silver coins from elsewhere, all of which are now housed in Tehran. Meadows 2003 has new notes on the Apadana foundation deposit (Inventory of Greek Coin Hoards [IGCH] 1789) that seek to provide a firmer interpretation of this important numismatic evidence. Zournatzi 2003 argues that these coins were symbols of Darius I's control of western sources of wealth and leading centers of western economic activity. Work on the building continued over a lengthy period, from Darius to Xerxes with several later changes.

¹¹⁹ The iconography and artistic program of the façade reliefs have been studied extensively. See, e.g. Roaf 1983; Walser 1966; and more recently: Gropp 2009; Root 2007, 2008.

¹²⁰ Tilia 1978, 69. Mr. Bordbar, former curator of the Persepolis Museum, and I were not able to locate the potsherds in a survey conducted in the storerooms in 2008.

excavated in front of the east façade of the Apadana. The material awaits chemical analysis.¹²¹

Evidence connected to painter's activities comes also from the indoor structures of the building and elsewhere nearby. In room 6 of the southern tower of the Apadana, Schmidt excavated a bowl lined with green pigment. Though the substance had never been properly analyzed, Schmidt suggested that it may have been used for repairs of the walls and floors in the building.¹²² During the final excavation season in 1939, a shard encrusted with a blue pigment was found in room 21 of the Apadana and analyzed by Matson as Egyptian blue.¹²³

Elsewhere on the Takht, paint bowls were found. As noted previously, Herzfeld found a bowl containing actual pigments in the so-called Harem area. In the Treasury, Schmidt excavated a "grinding bowl" of gray basalt, smoothed by use on the interior. In the same spot, he found a limestone polisher or grinder retaining traces of red pigment.¹²⁴ He also found a small stone object covered with "pink matter."¹²⁵ In 2008, I identified in the storerooms of the Persepolis Museum, a large number of blue pellets, each measuring some 2 cm in diameter similarly to those photographed by J. Lerner in 1975 (**Figure 3.22**).¹²⁶

Another group of paint bowls and associated material of Achaemenid date were excavated by the Italian-Iranian team below the southwestern corner of the platform during work that continued until 1973 in the area of the so-called Palace H. This zone bears remnants of at least three successive buildings, two of Achaemenid, one of post-Achaemenid date.¹²⁷

In December 1971, after excavations were conducted southwest of Palace H, samples from a bowl containing pigments were given to Lerner for analysis (Lerner log, 7). Especially important, however, was a stay in summer 1975, when Lerner was able to take detailed photographs of a large number of fragments with traces of pigments on them. She was allowed to take some four dozen samples of pigments from the monuments for further chemical analysis.¹²⁸ The samples included pure pigments from cleanings that were conducted below the eastern doorway of the Central Building in spring 1975.¹²⁹

¹²¹ Nagel 2018a. ¹²² Schmidt 1953, 74 and figure 32, "room 6."

¹²³ Schmidt 1957, 133 = PT 7 381, Plot HE 41. This sherd is said to be housed in the Institute for the Study of Ancient Cultures but could not be located in 2007. In the same room of the Apadana, pieces of gold foil were found (Schmidt 1953, 75), but their present location is unknown.

¹²⁴ Schmidt 1953, 191, room 81 = PT 6 452; Schmidt 1957, 102, plate 80.10.

¹²⁵ Schmidt 1953, 185, room 51; Schmidt 1957, 102–3, plate 80. 12 = PT 6 213, lost at sea.

¹²⁶ Nagel 2018a; Oudbashi and Hessari 2021. ¹²⁷ Tilia 1974, 239.

¹²⁸ Stodulski et al. 1984. I am most grateful to Judith Lerner for providing a copy of her sample log from July 29 to August 9, 1975.

¹²⁹ Mousavi 2002, 245.



3.22. Pellets of blue excavated on the Takht. Persepolis Museum, storeroom. Photo: Author

Recent excavations at “Persepolis West” provided more evidence for activities connected with the preparation of paints and other materials for decoration in the form of blue pellets and other materials.¹³⁰ Direct evidence connected with painter’s activities has also been excavated at Susa. Clumps of earth encrusted with paints were noticed by Roman Ghirshman in the 1940s in the area of the Apadana and by Daniel Ladiray at the Gate of Darius in the 1970s.¹³¹

Suffice to say not only is the study of the residue inside these bowls of major relevance for our understanding of the materials but so would be the verification of the date of the ceramics. As complicated as establishing

¹³⁰ Amadori et al. 2021.

¹³¹ Perrot 2013, 219 n. 17.

chronological sequences of pottery in the Achaemenid Persian Empire is, these containers remain a key element in our knowledge gap at present.¹³²

DISENTANGLING POLYCHROMIES: COMPARING ACHAEMENID PERSIAN GLAZED BRICK FAÇADES

The very recent excavations at Tol-e Ajori near Persepolis revealed previously unknown and very important sets of in situ glazed brick façades from a monumental gate constructed in the sixth century BCE.¹³³ The existence of sets of colorful glazed bricks on the Persepolis terrace was already known from explorations made by Weld-Blundell in 1892 and Herzfeld's work on the site in 1928. Between 1931 and 1939, large numbers of glazed brick fragments were found, especially in front of the Apadana: along the eastern façade and near the northeast tower.¹³⁴ Early Herzfeld's letters from 1933 refer to these fragments:

We now have heaps of enameled bricks, the sort they have in Babylon and Susa, only they are purely ornamental: circles, rosettes, reed like plants ending in palmettes, triangles etc. One could do a whole wall or whole friezes with them. Their colors are preserved wonderfully, much brighter and more luminous than those at Susa. . . . Thousands of tiles, but we need a museum atelier with skilled specialists.¹³⁵

A tentative reconstruction of these panels on the Takht was soon proposed by Krefter and published in April 1933.¹³⁶ In an undated sketchbook, Herzfeld drew a panel of these flat glazed enamel bricks on paper and noted craftsmen's

¹³² On ceramics in the empire: Genito and Maresca 2016.

¹³³ Amadori et al. 2017; Askari Chaverdi et al. 2014; Laurenzi Tabasso and Ridolfi 2017b.

¹³⁴ Herzfeld 1933, 1938, 38–41; Schmidt 1953, 70, figure 35.

¹³⁵ “Wir haben jetzt Berge von emaillierten Ziegel, wie die aus Babylon und Susa, nur dass es meist rein ornamental Muster sind: Kreise, Rosetten, schilfartige Pflanzen, die oben in Palmetten enden, Dreiecke etc. Man wird daraus eine ganze Wand bzw. ganze Friese aufbauen können. Ihre Farben sind wundervoll erhalten, viel leuchtender und heller als z.B. in Susa. . . tausenden Ziegel, man braucht dazu aber Museums-Atelier mit geschulten Mitarbeitern” (trans. mine). Herzfeld, letter to James Breasted, January 20, 1933. Institute for the Study of Ancient Cultures Archives. References appear in three more letters, in which he refers to “Berge von Ziegeln” in front of the Apadana. These letters date from May 12, 1933 and July 8, 1933, and November 16, 1933. Breasted became keen to restore a portion of this frieze for a new museum as is evident in a letter from June 6, 1933: “I am very anxious to secure long stretches from the colored design of enamelled brick. If we could put up a small Persian museum building alongside our present new Oriental Institute building we could build a frieze of this design of enamelled brick entirely around the exhibition hall.” Breasted, letter to Ernst Herzfeld, June 6, 1933. Oriental Institute, Archives.

¹³⁶ Herzfeld 1933, 488.

marks on their backs.¹³⁷ This archival discovery has important implications for our understanding of the working process involving polychrome brickwork and current approaches. Masons' marks have been well documented on the Persepolitan relief sculptures and columns.¹³⁸ It will ultimately be necessary to compare the stone working marks with those on the backs of the bricks as recorded by Herzfeld and those reported on the recent finds from Tol-e Ajori.¹³⁹ As further glazed bricks were excavated in the southern parts of the Apadana (southeast tower: Schmidt 1953, 122 notes two separate layers with glazed bricks), we can presume that the upper parts of the Apadana façade were at one point covered with these tiles.¹⁴⁰

A panel with ornamental décor was rather “arbitrarily combined” as Schmidt admits and published in a black and white photograph.¹⁴¹ That this restoration made little sense is apparent in Schmidt's own wording and from a quick look at the bordering parts of the panel, where no attention was paid to any matching of the fragments. Three separate panels with ornamental décor were later reconstructed. Of these, one is an almost exact copy of Krefter's first watercolor reconstruction¹⁴² and is today displayed in the Museum at Tehran (Inv. No. 2003). The other two, in the Museum of Persepolis, perpetuate a model that pays little attention to the combination of the bricks. It is not known to me at this point exactly when these reconstructions were made and who supervised them.

A second set of glazed bricks, also excavated in the same areas in the vicinity of the Apadana, are to be separated in that they preserve cuneiform characters “glazed creamy white on a field of light turquoise.”¹⁴³ These bricks inscribed with the name of Xerxes were reassembled, both on paper and in the round.¹⁴⁴

One fragment of a brick relief, preserving a segment of curled and wavy hair (unglazed?) has been discovered on the Takht – from room 38 in the Treasury. It indicates that figural ornamentation was occurring on the façades, too.¹⁴⁵

Sami also noted fragments of glazed tile apparently from an area of the interior of the Apadana.¹⁴⁶ His publication does not, however, record details of

¹³⁷ National Museum of Asian Art, Archives, Smithsonian Institution, Washington, DC, Ernst Herzfeld Papers, Sk-XVII Skizzenbuch Persepolis, 104. Cp. Sk-IV Skizzenbuch Persien 1923 (1928), 59. Cp. N-107, 73 Persepolis. Apadana, glazed tile frieze (“Feb. 17, 1933”).

¹³⁸ Nylander 1974; Roaf 1983. ¹³⁹ Askari Chaverdi et al. 2013.

¹⁴⁰ Only one glazed brick was recorded for the so-called Harem (south of corridor 12: Schmidt 1953, 249, figure 107 I).

¹⁴¹ Schmidt 1953, 91, figure 35. ¹⁴² Herzfeld 1933, 488. ¹⁴³ Schmidt 1953, 71.

¹⁴⁴ National Museum of Asian Art, Archives, Smithsonian Institution, Washington, DC, Ernst Herzfeld Papers, N-107, 73 (February 17, 1933). The *Illustrated London News* of March 25, 1933, covered many of Herzfeld's discoveries with photographs. See Schmidt 1953, 98, figure 42: Chicago, Institute for the Study of Ancient Cultures Museum Inv. No. A 24112. A second reconstructed inscribed brick panel is today on display in the National Museum at Tehran.

¹⁴⁵ Schmidt 1957, 183 and plate 41, figure 22 – PT5 428. ¹⁴⁶ Sami 1955, 14.

the motif and its polychrome scheme. The fragments of the glazed bricks from Persepolis in Washington, DC have now been systematically inventoried, cataloged, and analyzed.¹⁴⁷ This is not the place to discuss the many exciting and very promising new investigations around the colorants and aspects involving the technologies of crafting the glazed brick façades in Mesopotamia and Achaemenid Persia. Ongoing work on all of these assemblages will help characterize and contextualize the materials from the Takht, Tol-e Ajori, Susa, and beyond.¹⁴⁸

THE ORIGINAL POLYCHROMY OF THE FAÇADE OF THE TOMB OF DARIUS I AT NAQSH-E RUSTAM

As we had seen, already in the nineteenth century, the rock-carved façade of the Tomb of Darius I (522–486 BCE) was the subject of important observations on original polychromy. Schmidt published the findings of the Chicago 1930s expedition at Naqsh-e Rostam in 1970. Despite his inattention to the earlier evidence provided in the writings of Houssay, Schmidt does offer crucial *new* information about the original polychromy of this façade, although it is embedded in such a large documentary publication that it has perhaps not achieved the attention it deserves. Traces of blue pigments discovered by Boris Dubensky (1899–1984), the expedition's photographer, in some signs of the DNa inscription behind the king's figure are sufficient proof that all characters of at least the Old Persian and Elamite versions of this inscription were painted blue, and we see no reason to doubt that all inscriptions on the tomb were treated in the same manner.¹⁴⁹ The evidence from the squeezes of the inscriptions provides important evidence (Figures 3.23 and 3.24). In addition, other structures of Achaemenid date including the important inscription of Xerxes at Ganjnameh near Hamadan still contain traces of an original blue paint in the inscriptions.

Some seventy-five years later, during restoration work between 2001 and 2005, it was possible to make new observations on the polychromy of the façade. There is abundant evidence of polychromy not only for the inscriptions but also for other parts of the façade. The central figure in the top register is Darius I, measuring 2.70 m high. He is depicted in profile facing a fire altar and the figure in the winged disk. Darius stands with his left foot forward on a three-stepped pedestal. The pedestal itself is resting on a throne platform. Traces of blue paint have been identified on the curls of the beard and hair

¹⁴⁷ Aloiz et al. 2016.

¹⁴⁸ Caubet 2021; Daucé 2013; Holakooei 2013, 2014, Holakooei et al. 2016; Kaniuth 2013, 2018; Maras 2010; Razmjou et al. 2004; Rodler et al., 2019; Gries and Fügert 2020.

¹⁴⁹ Schmidt 1970, 84.



3.23. Egyptian blue paints in the Old Persian inscription, Façade of the Tomb of Darius I at Naqsh-e Rostam. Photo: Hassan Rahsaz



3.24. Detail of Egyptian blue paint residues on squeeze taken from Old Persian inscription on the façade. Herzfeld Archives, National Museum of Asian Art, Washington, DC. Photo: Author



3.25. Identified paints on the figure of Darius. Façade of the Tomb of Darius I at Naqsh-e Rostam Photo: Hassan Rahsaz

of Darius (**Figure 3.25**). Traces of red paint have been identified on the visible eyelid, eyeball, and the lips. Black lines accentuate the inner eyelid. Traces of blue and white paint have been identified on Darius' headdress, the royal crown with three-stepped crenellations resembling the one Darius wears on his relief at Bisotun.¹⁵⁰

On the tomb façade, Darius I is dressed in the Persian court robe. Did Darius' dress resemble the detailed painted motifs detected on similar representations in Persepolis meticulously reconstructed by Tilia?¹⁵¹ The motifs may provide a clue to the original appearance of the king as he was depicted on the façade relief at Naqsh-e Rostam, even though to date no paint has been observed on the robe of the royal figure. A somewhat dark red pigment has, however, been recorded on the shoes of the ruler on the façade, and was perhaps a priming layer for an additional coating. No traces of paint have been identified so far on either the pedestal nor the fire altar depicted in front of Darius. Similarly, no traces have been identified on the figure in the winged

¹⁵⁰ Luschey 1968, 72, plate 33. For various discussions of the crown see, e.g. Calmeyer 1976 and 1984; Henkelman 1997; Root 1979; Schlumberger 1971; Von Gall 1974, esp. 147. No traces of paint have so far been documented for the great rock relief and inscriptions of Darius at Bisotun: Luschey 1968, 83: "Von einer ursprünglichen farbigen Fassung . . . konnten wir keine Spuren mehr feststellen."

¹⁵¹ Kuhrt 2007, 532, figure 11.25; Tilia 1978, 54, figure 6.

disk. Behind the image of Darius I are inscriptions in Old Persian, Babylonian, and Elamite. Abundant traces of blue paint from these inscriptions were recovered from paper squeezes Herzfeld made in 1923. These are now in the Herzfeld Archives in the National Museum of Asian Art, Washington, DC. In October 2009, conservator Janet Douglas and I examined the preserved pigments in the Freer Gallery's Conservation Laboratory and identified them as an Egyptian blue.¹⁵²

In 2003, traces of “red (?) colour pigments” were mentioned to Adriano Rossi by Hassan Rahsaz as having recently been discovered in an inscription on the southern tomb above the Takht.¹⁵³ I have not had the opportunity yet to verify this observation myself at close range. So far, in my examination of this tomb façade, logistical considerations have made it impossible to look at these inscriptions at close enough range. One hopes that eventually traces of all these façades might be analyzed to determine the paints' precise chemical makeup. If it turns out that the materials indicate a red pigment we must be aware that these could either have been used to indicate red or as a ground layer for an additional top layer (e.g. gilding?). Other preserved squeezes from inscriptions on the Takht and Naqsh-e Rostam in the Herzfeld Archives in the National Museum of Asian Art, Washington, DC have not yet been subject to levels of examination and testing as appropriate. At issue will be the possibility that some remnants suggesting gilding will be found to confirm the observations of Kaempfer in 1685.¹⁵⁴ It should be clear that the royal inscriptions, very much like the reliefs themselves, were therefore “animated.”

Courtiers and soldiers, representing the two columns of the Achaemenid Empire, are depicted in the flanks, the two top figures left of Darius being Gobryas and Aspathines, identified by their inscriptions, which were highlighted in blue.¹⁵⁵ Personifications of the lands of the empire in the various peoples who can be identified through their legends are also accompanied by inscriptions in three languages (Old Persian, Elamite, and Babylonian) highlighted in blue. These labels were framed with fine chiseled lines, also filled in with blue. The frames, first chiseled and then filled in with blue paint, have highlighted the message sent with the inscriptions themselves. Blue was also found in the leaf-like ornaments that constitute the uppermost part of the throne platform. Furthermore, the leonine creature which is part of the furniture preserves remnants of blue on the body and mane and red in the mouth.

¹⁵² National Museum of Asian Art, Washington, DC: Conservation Laboratory, Record No. LRN 7165 (February 1, 2010): FTIR-analysis, Scanning Electron Microscopy.

¹⁵³ Rossi 2006, 475 n. 105. ¹⁵⁴ Wiesehöfer 1991, 85.

¹⁵⁵ See, now Delshad and Doroodi 2019.

Traces of paint have been identified on the entablature, separating the middle and top register, measuring 1.60 m in height.¹⁵⁶ This entablature presumably represented the wooden roof of a palace; three horizontal units project into inverted steps in the form of plain bands. On the dentils in the lower unit, there were traces of red, and the background was painted in blue. Traces of red, blue, and green pigments were identified on the fillet of the register. Paints have been identified all over this entablature and also at the center of the area. On the last royal tombs, carved above the Persepolis Takht, these parts are adorned with a frieze of eighteen lions arranged antithetical with a lotus flower in the center.¹⁵⁷ The painted pattern on the façade of the tomb of Darius I is highly suggestive of an animal frieze found in sculpted form on the later Achaemenid tomb façades at Persepolis. There are traces of green in the fillet's central part indicating the existence of an earlier painted lotus flower in the center.

The middle register evokes an architectural façade featuring four plain columns on rectangular two-stepped bases with a torus and bull capitals carrying a beam below the architrave. As noted in connection with evidence for actual stone columns, Schmidt identified traces of blue paint on the bull capitals represented on the tomb façade. This is in accordance with the blue identified on the body of the animal protome capitals of the palaces at Persepolis. The horns of the bull protomes carrying the roof on the top register were made separately. No details have been observed indicating the type and appearance of these horns.

Traces of original paint were also identified on the Egyptianizing cavetto cornice in the middle register's central doorway. The leaves of this cornice were decorated in an alternating blue and red color scheme, with a fin in the center of each of the individual leaves – a color scheme evoking that scheme known as “painted leaf” from the façades of contemporary Egyptian and Greek monuments.¹⁵⁸ On the door leading to the tomb chamber of Darius I, the blue leaves were decorated with a red fin, while blue fins correspondingly filled the other scales.¹⁵⁹

Although all Achaemenid tomb façades in Naqsh-e Rostam and above the Persepolis terrace seem superficially to be similar in form and detail, such similarity must not necessarily mean that all looked the same in the end. Clearly, there was a uniform system of iconographical references but added

¹⁵⁶ No traces of paint were identified in the lower register of Darius' tomb. Musche's (2006) hypothesis of a free-standing wooden stairway enabling access to the tomb and therefore covering the lower register of the façade provides a convincing explanation for this absence.

¹⁵⁷ Calmeyer 2009, plates 17.3 and 32.1; Schmidt 1970, plate 75.

¹⁵⁸ E.g. Brinkmann 2008, figures 107–8, 119, 179. ¹⁵⁹ Nagel and Rahsaz 2009.



3.26. Façade of the Tomb of Artaxerxes II, 2007. Traces of blue paint are visible on the hair and beard of the guard. Photo: Author

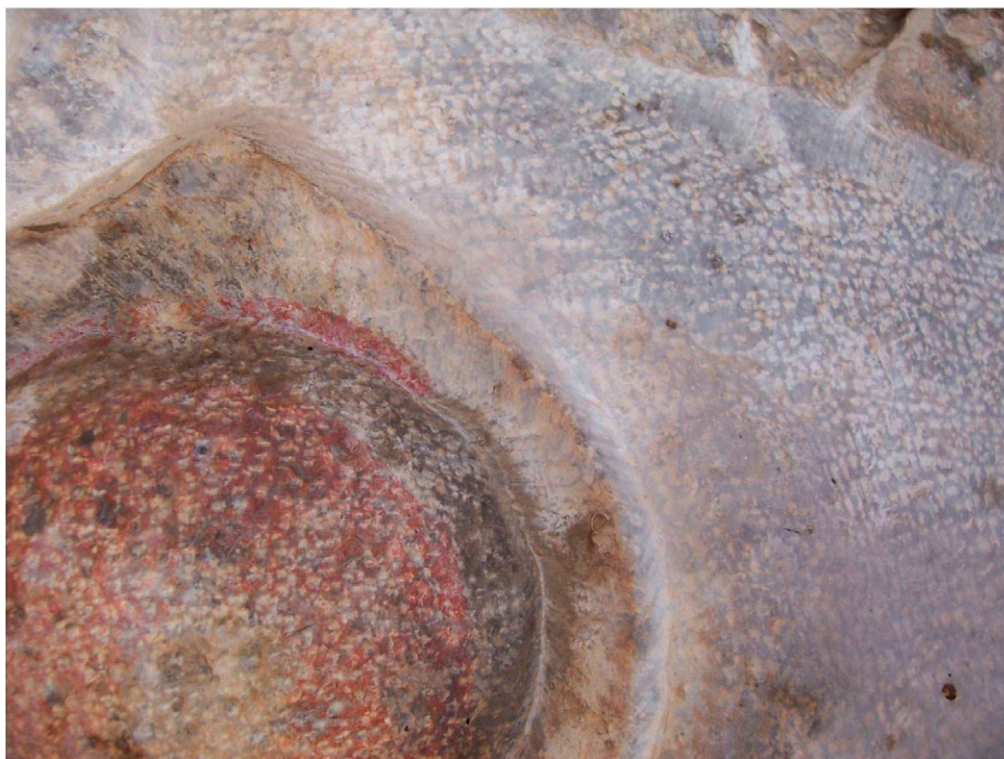
colors made differences. Since the publication of Schmidt's volume on the Achaemenid tombs at Naqsh-e Rostam and Persepolis, it has been established that the construction of the tomb of Darius I began early in Darius' reign, probably very soon after 520 BCE.¹⁶⁰ The Tomb of Darius I became a shrine and a model for all subsequent Achaemenid tombs. The carved iconographic motif of the façade of the Tomb of Darius I was repeated on the façades of the tombs of all subsequent Achaemenid rulers. Such was, however, not the case with the polychrome decoration. Although Schmidt did not observe any traces of pigments on the tombs of the successors of Darius,¹⁶¹ this opinion needs to be revised. Observations in 2008 revealed that the Egyptianized cornice of the doorway of the middle register of tomb V (= the tomb of Artaxerxes II?) at Persepolis has green and blue leaves rather than the red and blue found on Darius' tomb façade at Naqsh-e Rostam. No painted fins can, however, be identified on the leaf scheme (Figures 3.26–3.32).

¹⁶⁰ Schmidt 1970, 80–9.

¹⁶¹ Schmidt 1970, 92.



3.27. Façade of the Tomb of Artaxerxes II, 2007. Bull capital. Photo: Author



3.28. Façade of the Tomb of Artaxerxes II, 2007. Bull capital, traces of red paint layer. Photo: Author



3.29. Fragment of a capital in form of a protome in form of a bull: the right eye. From the capital of the audience hall (Apadana) of the Palace of Darius I (522–486 BCE). Limestone, 48 × 41 cm. AOD3. Photo: Franck Raux © RMN-Grand Palais/Art Resource, NY

Hassan Rahsaz and I argued elsewhere that the traces of paint on these later tomb façades are vestiges of the original polychromy, applied to the surface of the façade in the months immediately following the carving of the sculptures and inscriptions.¹⁶² Naturally, the paints could also stem from later periods of

¹⁶² Nagel and Rahsaz 2010. The aspect of repainting ancient monuments is key to understanding aspects of care. Unfortunately, we have not been able to fully grasp this aspect for stone monuments at Persepolis. Repairing of stones was very common at Persepolis as studies by Tilia and others have shown, and painting these must have been part of the process. Several studies of this aspect in eastern Mediterranean art have been collected in a special volume of *Techne* dedicated to the theme (Bourgeois 2014a) and, more recently, Neri



3.30. Detail of cavetto. Façade of the Tomb of Artaxerxes II, 2008. Photo: Author

repainting. Only in recent years and with new investigations did researchers become aware that at least one more tomb façade was once painted, too, as a team could verify traces of paints on the façade of the Tomb of Xerxes.¹⁶³ It is,

et al. 2022 (Roman period). For Iran, recent work at Isfahan offers exciting directions: Zamani and Ahmadi 2022.

¹⁶³ Ahmadinezhad et al. 2020, 75–6, figure 7.



3.31. Detail of cavetto. Façade of the Tomb of Artaxerxes II, 2008. Photo: Author

however, beyond the scope of this book to probe that issue further. Future investigations and technical analysis may well provide additional information about the existence of possible paint preparation layers or re-paints. The interior of the tomb may have been painted, too, but no evidence has been found thus far.

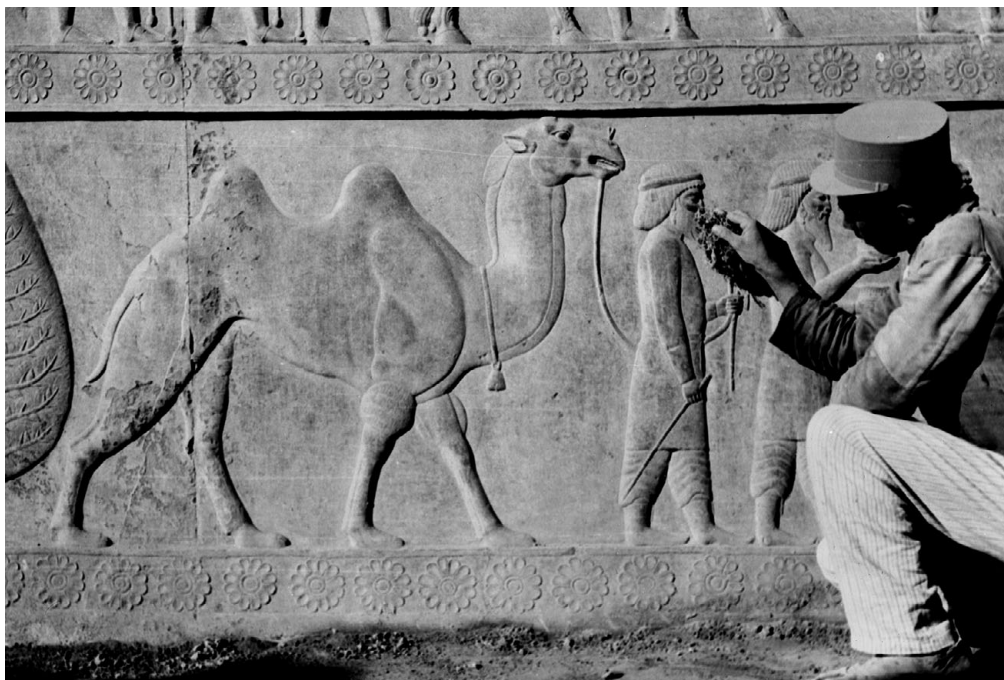
PRELIMINARY CONCLUSIONS

The historiography of the modern rediscovery of the notion of polychromy in Achaemenid Persia teaches us several things. At first, paints and surface embellishments were discovered at all sites already during the nineteenth century. Important observations were being made by Texier and Weld-Blundell at this time. In the 1920s and 1930s, in his notebooks, letters, and artifact collection, Herzfeld left us important evidence, but it was never published and the paints he collected intentionally and unintentionally were never properly analyzed. Only Lerner and Tilia paid systematic attention to the polychromies of Persepolis after the mid-century. It is striking though, that Tilia never reported about any scientific analysis that was undertaken, nor was there an extensive photographic documentation campaign that included standard color reference charts available at that time. To this point, commentaries on the materials



3.32. Detail of cavetto. Façade of the Tomb of Artaxerxes II, 2008. Photo: Author

employed as surface applications are modest at best. The review of material evidence of polychromy on the monuments at Persepolis, Naqsh-e Rostam, and Susa assembled here proves the importance of color in the built environment of the Achaemenid court and demonstrates, that further analytical work is imperative before larger and more general conclusions can be made.



4.1–4.2. Two photographs of Persian workmen cleaning the surface of stone reliefs on the eastern façade of the building referred to as the Apadana at Persepolis, 1932 or 1933. Institute for the Study of Ancient Cultures Museum Chicago. Photographer unknown. Courtesy of the Institute for the Study of Ancient Cultures Museum University of Chicago

CHAPTER FOUR

UNCOMFORTABLE TRUTHS: CHALLENGES OF DOCUMENTING AND PRESERVING ACHAEMENID PERSIAN POLYCHROMIES

Documentation of evidence for polychromy on the limestone façades and monuments of Persepolis, Naqsh-e Rostam, and Susa extends back over two centuries. This effort has been intensified in the last several decades, as we have seen in previous chapters. In all that time many approaches to the recording, preserving, and analyzing of traces of paint have come and gone. Today there are advanced nondestructive techniques for discerning elusive traces of pigment. The most effective of these are more viable in a museum conservation laboratory on isolated monuments or fragments than they can possibly be at vast open-air sites. Thus, for instance, it was possible to use a portable XR-fluorescence spectrometer (XRF) when examining a number of Achaemenid Persian relief sculptures housed in the Vorderasiatisches Museum Berlin.¹ I was able to employ a digital microscope (Keyence) on outdoor monuments in Persepolis and when studying collections in the museums of Persepolis, Tehran, and Washington, DC, together with stone conservation specialists.²

Efforts undertaken at Persepolis itself in recent years are attempting to deploy systematic methods and up-to-date techniques for the detection of

¹ Nagel 2010. XRF is currently one of the most efficient methods for identifying chemical elements. By extension, this can help us to understand surface treatments on stone sculpture. XRF has been used for the scientific examination of materials on the site of Persepolis in recent years, too: Laurenzi Tabasso and Ridolfi 2017a.

² Detailed examination reports are available from the author upon request.

polychromy under the challenging conditions presented by a daunting array of large-scale monuments, many of which have remained exposed on site since the late sixth century BCE. Since that time they have suffered from the war depredations of Alexander and his armies to the subsequently heavy-handed harvesting by collectors and even the interventions of some destructive techniques that were innocently intended as modes of documentation.

On the site, beyond traces of paint visible to the naked eye on readily accessible sections of monuments, many coatings and paints are often found hidden in rather inaccessible parts of the same monuments. Investigations with an electrical crane and ladders, supplied by the conservation team at Persepolis, enabled me to identify a selected number of paint residues and painted patterns on monuments in areas not easily reached and therefore overlooked in the past. The scope of the site necessitates a step-by-step approach. Additionally, my preliminary studies in the storerooms of the museum at Persepolis have revealed excellent prospects for identifying more paint traces and well-preserved surfaces on fragments from the site that are stored there. Many of these fragments have been protected from the elements and have not been subjected to cleaning and restoration procedures.

ANALYTICAL METHODS

Today, there are excellent research facilities and laboratories in the Islamic Republic of Iran. Furthermore, museum collections around the world that house fragments of Achaemenid Persian sculpture are supportive and allow access to experts and resources for pigment analysis and identification. This highlights the fact that the conservation of the monuments of Persepolis is a major responsibility not only of Iran but also of the entire international community interested in preserving the knowledge of polychromy of Achaemenid Persian art.

Samples of pigments were removed from Persepolis and Pasargadae a long time ago and have already been analyzed and the results published.³ But much remains to be done in analyzing the paint samples already removed. Techniques of pigment analysis, enabling a characterization of the surface and internal structures of samples in laboratories involves the use of Scanning Electron Microscopy with Energy dispersive X-ray analysis (SEM/EDX) and Fourier transform infrared spectroscopy (FTIR).⁴ Often, fairly small amounts

³ Stodulski et al. 1984.

⁴ Janet Douglas, a former conservation scientist at the National Museum of Asian Art, Smithsonian Institution, examined pigments preserved in the squeezes from the inscriptions of the façade of the Tomb of Darius I at Naqsh-e Rostam with a Philips XL30-FEG ESEM. For a brief introduction to this method see Shaer 2003, 17.

are enough to produce reliable results, and one can identify pigments by matching them with existing samples in pigment reference collections. One such reference collection is the *Forbes Pigment Collection*.⁵ Today, there are also nondestructive methods to determine specific pigments such as Egyptian blue, and it is hoped that these can be applied in the future.⁶

By their very nature, mineral-based pigments fade over time. They change color and then disappear completely.⁷ For these reasons, there are obvious challenges when rendering color reconstructions that satisfy the public's curiosity to see how a monument "really looked." There are also challenges of even simply describing colors and hues verbally of what we see in the preserved record in ways that do not embed assumptions that cannot be sustained by the actual evidence.

The Munsell Chart system for many years has been used as a standard of reference for describing hue in archaeological work in several media such as ceramics and glass. The objectivity of this standard of reference has sometimes been questioned.⁸ Thus, at present, much ambiguity exists in descriptions and discussions by various scholars of what they see on the monuments as they are now. Standardization should be a goal, and, thus, efforts have been undertaken to resolve this problem by the employment of colorimeters.⁹ This points to the importance of sample studies. By tracing chemical elements in the samples that "produced" these hues, a fairly common communication problem and the complexities of an objective measuring system can be partly resolved.¹⁰

These factors make it impossible, perhaps, to be definitive about the total original look of the polychrome environment of once rather large sites such as Persepolis, Babylon, or Susa. Nevertheless, there is much to be gained from a documentation of the empirical evidence, with all its frailties. A push toward expansion of data under controlled and recorded conditions offers expanded possibilities of interpretation as time goes on.

INFORMATION OR PRESERVATION?

Weathering and damage caused by other environmental challenges are important factors determining the deterioration of architectural and sculptural remains that have been exposed to the elements.¹¹ This chapter explores how strategies of site documentation have caused unintended damage to the evidence of polychromies at Achaemenid sites. In recent years, cultural

⁵ Bewer 2010; Carrière and Omecinsky 1983; Finlay et al. 2018.

⁶ See, e.g. Verri et al. 2009.

⁷ E.g. Daniels 1987; Green 2001; Gutscher et al. 1989; McCormack 2000; Schiegl et al. 1992.

⁸ E.g. Gerharz et al. 1986; Nagel 2019. ⁹ Strudwick 1991.

¹⁰ Braenne 2009; Bregnhøj and Christensen 2009; Vandenabeele et al. 2009.

¹¹ For Persepolis: Mohammadi and Krumbein 2008.

heritage experts have begun to realize that there is an uncomfortable truth in the fact that those who have in the past acted in the name of conservation have at the same time done irreversible harm to monuments.¹² I hope to contribute here to recent efforts to understand the complex strategies employed for the conservation of the monuments of Persepolis. Understanding the history of archaeological fieldwork *and* conservation efforts at Persepolis – for the monuments still on the site as well as for those now in museums – is essential in determining a viable plan for the future. This chapter thus reviews the challenges related to the study of polychromies (e.g. pigments and minerals in light of weathering) and the development of discourse on issues of the state of preservation of the site throughout the nineteenth and twentieth centuries. I must state from the very beginning that this is a preliminary survey of the evidence. Many archives remain unexplored regarding their information on conservation practices on the Takht's monuments. Besides a number of archives outside Iran, such as those of the non-Iranian archaeologists already mentioned in previous chapters, the archives of Mohammad-Taqi Mostafavi, Ali Sami, A. Shapur Shahbazi, and Akbar Tajvidi will certainly yield additional important information. Attention should also be paid to the archives of André Godard (1881–1965). As advisor for archaeological fieldwork activities conducted throughout Iran for many decades, Godard played a key role in twentieth-century preservation and documentation efforts.

CONSERVATORS AND ARCHAEOLOGISTS

The term “conservation” needs to be clarified. Languages bring all kinds of cultural baggage with them. In the English language, the term “conservation” has sometimes been equated with “preservation” and “restoration.”¹³ Although the three terms work together on many levels and must do so for many reasons there is a clear distinction in what each means in relation to current strategic and theoretical thinking. According to one more recent definition, conservation is “a way of maintaining and reinforcing the meanings in an object; it is even a means through which the appreciation for what an object symbolizes is expressed.”¹⁴ The guidelines of the American Institute of Conservation prefer the term “stabilization” for this restricted area of the modern conservator's range of expertise. I use the term conservation in opposition to that of restoration. Restoration aims to “return an object into a former state.”¹⁵

¹² Richmond and Bracker 2009, xiv.

¹³ Muñoz-Viñas 2005; See, also, the contributions in Henry 2006.

¹⁴ Muñoz-Viñas 2005, 213. ¹⁵ Ibid., 17.

By their very nature, pigments and the analysis of pigments ought to belong to the field of the conservation specialist. I do think that only a collaborative effort will bring us closer to understanding polychromies at Persepolis. The obligation to record and preserve evidence for future investigators must be inherent from the very beginning. Today, much more sophisticated techniques in archaeological conservation can be employed than when modern “scientific” excavations began.¹⁶ Publicizing reports of conservation efforts conducted on ancient monuments leading to new revelations on polychromy is crucial. The impact of such energetic efforts to disseminate findings are startlingly apparent for the Parthenon on the Athenian Acropolis.¹⁷ Already in the early twentieth century, it was widely known that “in the case of coloured objects it is of greatest importance to take in hand the treatment immediately after they have been dug up, for they rapidly lose their colour or become bleached, or the colour may even come off in the form of dust. As soon as an archaeologist discovers objects of this kind he must at once protect them from light, rubbing, etc. until they can be handed over to an expert.”¹⁸

Deterioration starts within hours of initial excavation.¹⁹ This very moment of recovery is the time when the artifacts offer the greatest amount of information. A key element in tracing the modern historiography of the study of polychromy in Persepolis is therefore an investigation of conservation (i.e. stabilization) efforts that accompanied archaeological fieldwork that took place over time. A detailed documentation of conservators’ efforts accompanying the various excavation campaigns would be an extraordinary benefit as we attempt to understand the current condition of individual monuments and fragments. So too, detailed records of stabilization procedures in museums that hold Persepolis and Susa stone monuments would help tremendously. Unfortunately, this type of data is often obscure, if it exists at all, especially, but not exclusively, for the early years.

Programs of conservation conducted by past generations prove how important collaboration is in detecting remains of polychromy and then in preserving them for analysis. Conservation cannot be a technical activity ancillary to archaeology. It must be a component of fieldwork, often involving critical and decisive intervention, if studies in polychromy are to proceed. Here, we return to the comments by Italian conservation specialist Melucco Vaccaro

¹⁶ Pye 2009.

¹⁷ Aggelakopoulou and Bakolas 2022; Aggelakopoulou et al. 2022; Jenkins and Middleton 1988; Kouzeli 1989; Kouzeli et al. 1990; Mallouchou-Toufano 2006a, 2006b; Orlandos 1978, 645–8; Summitt 2000, 420–4; Vlassopoulou 2008; Williams et al. 2007.

¹⁸ Rhoussopoulos 1911, 143.

¹⁹ It has been noted that pigments are certainly best preserved by earth. J. Reade noted that large-scale figures freshly reexcavated at Nimrud in the 1960s had much more black paint preserved on their hair than those in museums usually have: Reade 2000, 618.

who stated that it was modern humanity which caused the disappearance of the polychrome in the past.²⁰ A quick review of the history of conservation of the many fragments held in different museum collections around the world proves Melucco Vaccaro's valid points.

Only in recent decades has the stabilization of the monuments of pre-Islamic Iran become a real agenda, especially stimulated by the earthquakes that caused tragic destruction to the monuments in Bam. Compared to an overwhelming amount of literature on the history of archaeology of Achaemenid Iran, less has been written on the conservation of the Achaemenid monuments.²¹ Since early work on the Takht and at Naqsh-e Rostam is reflected mostly through the writings of Europeans, it is important to understand European approaches to polychromy and conservation within a historical perspective before evaluating their relevance to the polychromy of the material culture of Achaemenid Persia.²² However, one has to stress with Mousavi that in many areas of Iranian archaeology "two sets of literature exist, one written in Western languages, the other in Persian."²³

The early eighteenth century witnessed the first modern documented removal of limestone sculptures from the Takht. The Dutchman Cornelis de Bruijn (1652–1726) took fragments from the Apadana and the Palace of Darius for transport to Europe. De Bruijn, who visited the Takht between November 1704 and January 1705, removed a figure from the Apadana and sent it to Holland where it arrived broken in pieces.²⁴ By 1811, almost the entire upper

²⁰ Melucco Vaccaro 1996, 369; 1984. In November 1970 the periodical *Studies in Conservation* published a special issue on the "Conservation, Technique and Examination of Polychromed Sculpture": e.g. Philippot 1970.

²¹ Aminzadeh 2004; Ardestani 2004; Bazljou 2004a, 2004b; Mahmoudzadeh and Oudbashi 2004; Sheikoleslami 2004; Soheil 2001. There is a significant bibliography on the history of archaeology in Iran, both on a national and site-specific level. See, e.g. Abdi 2001; Mousavi 2002 (Persepolis); Nasiri-Moghaddam 2004 (for the early years of Susa); Niknami 2000. On the history, politics, and efforts of conservation in Iran see esp. Jokilehto 1999, 270–4; Paone 1977; Soheil 2004, 2009; Vatandoust 1994.

²² While the history of architectural conservation is in itself a developing field with its own ethics, philosophy, and theories (e.g. Jokilehto 1986; 2009; Orbasli 2007; Richmond and Bracker 2009; Stanley-Price et al. 1996), lack of communication and exchange between archaeologists, conservation specialists, and other professionals has been the major obstacle to overcome (Muñoz-Viñas 2005, 117–9). One of the early milestones in theories on conservation and restoration is Brandi 1963. Institutional milestones include the establishment of the Istituto Centrale del Restauro (ICR) in Rome, founded in 1939; the inaugurations of the International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM), active since 1959, and of the International Council on Monuments and Sites (ICOMOS) in 1965, originally to complement ICCROM, and the International Council of Museums (ICOM) in 1946.

²³ Mousavi 2005, 445. Following conversations with P. Briant I agree that a third set of literature exists which is written in Russian.

²⁴ Benveniste 1951; de Bruijn 1720, vol. II: 9–44; Drijvers 1991, esp. 96; Drijvers 1993, 89, n. 14 with further references.

half of the top row of reliefs on the Northern façade of the Apadana had been removed.²⁵ The removal of elements continued well into the early decades of the twentieth century; but other practices increasingly turned out to be a major challenge to the preservation of evidence of the site as a whole and of polychromy specifically.

MOLD MAKING AND SQUEEZES

From the eighteenth century onward, we encountered another destructive practice that had a tremendous impact on the surfaces of the monuments on the Takht: making squeezes and molds. Squeeze-making was a method of recording ancient monuments (especially carved inscriptions) for study off site. Its goal was laudable; but its results were often highly problematic. Squeeze-making, by its very nature, has endangered evidence of polychromy and has inadvertently created confusion in the record of polychromy. In the early years especially, the materials used in the process produced misleading residual “evidence” of coloration on the stone. In the eighteenth century, for example, Carsten Niebuhr (1733–1815) produced hand copies of the cuneiform inscriptions when visiting the Takht for about three weeks in the spring of 1765. He also took an early form of wet squeeze from some of the inscribed surfaces. According to the early nineteenth-century traveler Claudius Rich (1787–1821), Niebuhr had brushed a dark material onto some inscriptions in order to take a form of a wet squeeze. Rich noted traces of this material on the inscriptions on one of the portals of the Palace of Darius. Remains of this modern substance are still visible on a fragment from the Palace of Darius (DPc), today in the British Museum.²⁶

Niebuhr was not sensitive to the damage he was inflicting on the walls of Persepolis by applying this dark coating in order to make his squeezes. The notion that anyone might wish to examine the stone surfaces at some later date for other scientific purposes was completely alien to his context. He observed that de Bruijn had marked his name in red crayon on several structures on the Takht. But clearly, this was not meant in a critical way. Morier, writing in 1816, commented that Niebuhr had written his own name in red chalk so that it “seems to have been done just yesterday.”²⁷ Out of the 158 names of travelers and antiquarians tabulated by Simpson via graffiti on the Persepolis platform, 64 alone are on window frames and the inner walls of Palace of

²⁵ Allen 2009, 2013, 2016; Barnett 1957, 57; Porter 1821, vol. 1: 601; Roaf 1987. Limestone fragments from many monuments in Persepolis can be found in museums from Los Angeles and San Francisco to Australia and beyond. My dissertation (Nagel 2010) included an appendix of fragments that was updated regularly and shared with the authorities in Persepolis.

²⁶ Rich 1839, 252; Simpson 2007a, 343 = BM ANE 118852. ²⁷ Simpson 2007a, 344.

Darius, many are highlighted in paint. So the investigator of polychromy today must be mindful of the possibilities of intrusive elements of surface treatment certainly from the eighteenth century onward.

Squeezes from an inscription related to Xerxes and Darius from Ganjnameh in Hamadan were executed by Heinrich Carl Haussknecht (1838–1903) in November 1867. The resulting product, today in Jena, still preserves traces of original paint.²⁸ Recent investigations confirmed that the original inscription on the site also preserves traces of blue paint.²⁹

The nineteenth century has often been described as the age of the cast: plaster casts were made from molds taken from original ancient sculptures, and almost everywhere in Europe large collections were formed.³⁰ The travelers in earlier centuries had taken draftsmen with them, who recorded antiquities in a noninvasive way. Now, paradoxically, a new method began to be employed, thus heralding a new age of “scientific” documentation. Often, these plaster casts were expensive to make, and a high level of diplomacy was involved in getting permission for taking molds. The casts were then used to teach students in fine art and art history and became important display items.³¹ Simultaneously, cast-making ushered in an era of practice that proved devastating to evidence of polychromy.

The practice of taking wet squeezes and making molds from casting off details and entire reliefs of the monuments on the Persepolis Takht continued well into the twentieth century. Countless negative impressions in the form of squeezes and molds were taken from inscriptions and monuments all over the platform. The details of the procedures used were seldom documented, and most of the squeezes and molds are lost. But one report of mold-making in Persepolis gives a vivid idea of one method used early on. A report by James Alexander written in 1826 attests that in that year, the Irishman, Ephraim Gerrish Stannus (1784–1850) “made several long shallow boxes of wood, in which he put quick lime, applied them to the sculptures, and allowed them to remain until

²⁸ Haussknecht 1868, 472; Nagel 2021b, 259. Diary, Saturday, November 1, 1867: “Auf einer der grossen Granitblöcke erblickt man etwas flussaufwärts. . . über seinem rechten Ufer, schon von weitem die 2 Keilschrifttafeln. Die rechte, Huldigung des Ormuzd durch Xerxes enthaltend, die andere die des Darius enthaltend. . . Die Darius Inschrift hat leider einen Riss, wodurch einige Stellen undeutlich sind, die Charaktere sind aber scharf eingehauen und gut erhalten. . . Die Xerxes Inschrift beklebte ich mit Löschpapier, um einen Abdruck zu nehmen, was viel Arbeit verursachte und mir 1½ Tage raubte.” See also Krebern timer 2013.

²⁹ Soheil Delshad, July 2019, pers. comm.

³⁰ Haskell and Penny 1981. In fact, many European antiquarians went to Athens and Egypt to make molds from the monuments, long before they collected and traded original objects. Already in 1783 the French had obtained permission to make molds of the Parthenon sculptures, and Lord Elgin’s original intention was to mold the monuments as well. His *formatori*, the actual makers of the molds and the casts, were known by name: Connor 1989, 187–8.

³¹ Bauer and Geominy 2000; Berchtold 1987; Donati 1999.

thoroughly dry. . . . The case was then taken off and sent to Bushir, containing the impression, from which the casts were again taken in lime.”³²

The earliest series of casts made from the molds by Stannus were displayed in the British Museum in London along with ten original sculptures from the Takht in 1825. When they were rearranged in 1865, because the British Museum had in the meantime acquired another large number of original sculptures from Persepolis,³³ the casts were deliberately painted brown by Brucciani, owner of a cast gallery nearby. The reason behind such coloring of the casts needs to be further investigated. In 1937 the casts were relocated to the new Iranian gallery of the museum. Most of these early casts are today in the British Museum’s Enlightenment Gallery.³⁴

On his visit to Persepolis on June 29, 1826, Alexander not only made observations on the techniques employed by Stannus, but also found excavations by John MacDonald Kinneir in progress. Alexander noted that Kinneir was “employing people in clearing away the earth from a staircase.” Little is known about Kinneir’s investigations on the site, but he is known to have been a regular visitor, judging from his graffiti dated 1808, 1810, 1820, and 1826.³⁵ In the early decades of the nineteenth century a large group of sculptures and architectural fragments were removed from the site. By the 1830s, both the casts and originals from Persepolis found their new home, along with Roman and Egyptian sculptures in the recesses of the British Museum’s Grand Central Saloon, where they remained at least until 1851.³⁶

Grateful as we are for Alexander’s descriptions of Stannus’ mold-making process, it would be helpful to know exactly what type of quicklime Stannus applied. Calcium oxide (CaO), for instance, turns into calcium carbonate over time. This considerably affects the surface of the limestone reliefs. An investigation or reconstruction of the practices of mold-making at the time would help us today to understand how much these episodes were likely to have caused changes to the surface of the reliefs. These changes now affect our ability to retrieve ephemeral evidence of polychromy.

In 1844, the Frenchman Lottin de Laval came to the Takht to make molds for the productions of casts destined for France. He treated the reliefs with water and a sponge before applying thin papers onto the stone to make the negative impressions. The technique used by de Laval is described in detail by Zapata-Aubé. The casts from these squeezes are today in the Musée de Bernay and in the Louvre.³⁷

³² Alexander 1827, 97–8; Simpson 2007b, 159. ³³ Mitchell 2000, 52.

³⁴ Simpson 2007a. ³⁵ Simpson 2004; 2007b, 159. ³⁶ Jenkins 1992, 114, 121.

³⁷ Chevalier 2018; Fontan 1994, 1998; Zapata-Aubé 1997, 35–6; McSweeney 2018. For a de Laval cast of an inscription, see, e.g. Chevalier 1997, 33, figure 18 (H. 58.5 cm; W: 97.5 cm). See also Simpson 2007a, 352 with further bibliography. According to Perrot and Chipiez 1892, 429, the casts in the Louvre must have gone on display in the 1890s. The history of the display of these casts remains to be written.

From the preserved documents, we learn that most molds of relief sculptures and inscriptions made by de Laval were taken from several places: the then-visible reliefs of the north stairway (eastern wing) of the Apadana, the reliefs on the stairways of the Palace of Darius, details of figures depicted in the standing door jambs of the Hall of 100 Columns, and several inscriptions from the site.

Only a few decades later, Cecil Harcourt Smith (1859–1944), who eventually became Keeper of Ancient Greek and Roman Antiquities at the British Museum, recommended that a more complete set of casts be commissioned for the British Museum “since so much of the monuments in Persepolis faced destruction due to the subsequent looting” (*The London Times* September 9, 1892). This new episode of mold-making took place in early 1892 and produced the largest set of replicas ever made at Persepolis and other sites in Fars. The results can be seen today in the British Museum. This time, papier maché molds were made by the Italian Lorenzo Giuntini (1844–1920) on relief façades from the Apadana (north), the Hall of 100 Columns, the Palace of Darius, and from monuments in Pasargadae.³⁸ After their return to England, the molds were used to make multiple casts that were then sold to institutions including the Nottingham Museum and Art Gallery, the Louvre, the Kaiser Friedrich Museum in Berlin, and the Smithsonian Institution in Washington, DC.³⁹ The molds themselves were deliberately destroyed soon afterward to ensure that the casts derived from them would remain a limited edition.⁴⁰ Assembled piecemeal during many decades the various casts of reliefs and inscriptions that remained on the Takht became highly valued.

The London Times for September 9, 1892 notes, regarding one of the reliefs in Pasargadae, that

The Cyrus monument is in itself a striking proof that Mr. Cecil Smith's expedition has not come before it was needed; already, since this mould was taken, the monument has been thrown down and broken; in a few years probably no trace of it will remain. It is, therefore, to be hoped that, while there is yet time, the *work will be continued until every fragment of Persepolitan sculpture within reach has been moulded, and so placed, in a measure, beyond the reach of absolute destruction.* The first set of casts from the new moulds will be presented to the British Museum, the second will go to the great museum of casts now being formed in New York, to the committee of which Mr. Cecil Smith is indebted for financial co-operation” [emphasis mine].⁴¹

³⁸ Simpson 2007b, 160–1; Smith 1893, 1932a, 1932b; Weld-Blundell 1893.

³⁹ During Weld-Blundell's stay, another set of molds for casts of both inscriptions and relief sculpture were made for the American diplomat Truxton Beale (1856–1936) on the site. These casts remain as of today in the storerooms of the National Museum of Natural History, Smithsonian Institution: Adler 1895. Cp. also Simpson 2007b, 161–2.

⁴⁰ Simpson 2007a, 353, 2007b, 161. ⁴¹ Anon 1892.

Mold-making of Persepolis sculptures was not limited to monuments still on the site. Throughout the nineteenth century, European museums holding examples of Persepolis reliefs took molds from these in order to produce cast series for display and sale.⁴² Since the first half of the nineteenth century, the British Museum had sold numerous museum plaster casts from those relief sculptures from Persepolis. In 1872, nine casts of reliefs from Persepolis, then in the British Museum, were exhibited in Berlin.⁴³ The South Kensington Museum in London, later to become the Victoria and Albert Museum, acquired British Museum casts of Persepolis stone reliefs.⁴⁴ Two casts of the set made by Giuntini in 1892 were sold to the Metropolitan Museum, one of which is preserved today at George Mason University in Virginia. In Mediterranean countries, throughout the later decades of the nineteenth century, it became increasingly difficult for museums to obtain casts made from new molds taken from monuments. There was ever more sensitivity to the damage the process could cause to the surfaces of the art – and particularly to vestiges of polychromy. In the case of the polychrome Archaic maiden, excavated between 1886 and 1891 on the Athenian Acropolis, for instance, official measures were taken to avoid repeated molding in order to safeguard the abundant evidence of original color. The practices deployed in Persepolis and other Achaemenid Persian sites, however, did not reflect this growing awareness. This was true even though the method of taking wet squeezes was already being criticized. In 1924, for instance, Alfred Lucas wrote: “Stone objects, which bear inscriptions, must on no account be wetted until the painted surface has been protected from the action of water, or the paint will probably be destroyed. The necessary protection may be given by spraying or otherwise treating the surface of the stone with some materials that are insoluble in, and unacted upon by, water.”⁴⁵

In 1900, Friedrich Sarre himself was able to make molds from several structures and monuments in Persepolis as well as in Pasargadae.⁴⁶ The photograph from 1923 introduced earlier shows Herzfeld’s team making impressions of the great inscription of Darius (DPe-f-g-h) on the south wall of the Takht.

⁴² The Phigaleia and the Parthenon sculptures in the British Museum also became attractive mold-making targets for several series in the nineteenth century, as documented in 1817 and 1836–7. In some cases the stone was washed with “soap lyes or some other strong acid” (Jenkins 1990, 101–5; Jenkins 2001, 16–7; Oddy 2002, 146). In 1852, Charles Newton was sent to Greece to complete the series of Parthenon casts for the British Museum: Connor 1989, 189.

⁴³ Bötticher 1872; Crüsemann 2001, 39 nos. 34–43, and plate 54; e.g. 118843, 118845.

⁴⁴ Anon. 1874, 10.

⁴⁵ Lucas 1924, 105. Lucas, who worked for the Egyptian Antiquities Service between 1923 and 1932, was instrumental in the consolidation and preservation of the finds from Tutankhamun collection.

⁴⁶ Rehm 2021. The focus of this campaign were stone reliefs on the Apadana and on door jambs from the Hall of Hundred Columns.

Herzfeld's documentation of the monuments also included squeeze-taking of a number of inscriptions on the façade of the Tomb of Darius I at Naqsh-e Rostam. Herzfeld took squeezes not only from the inscriptions but also from several details of the sculpted reliefs of the façade of the tomb at Naqsh-e Rostam, the Apadana at Persepolis, and of the figure of the winged genius from Gate R in Pasargadae. The Museum in Berlin has nine casts from the Herzfeld expeditions, though the molds seem to have been destroyed.⁴⁷

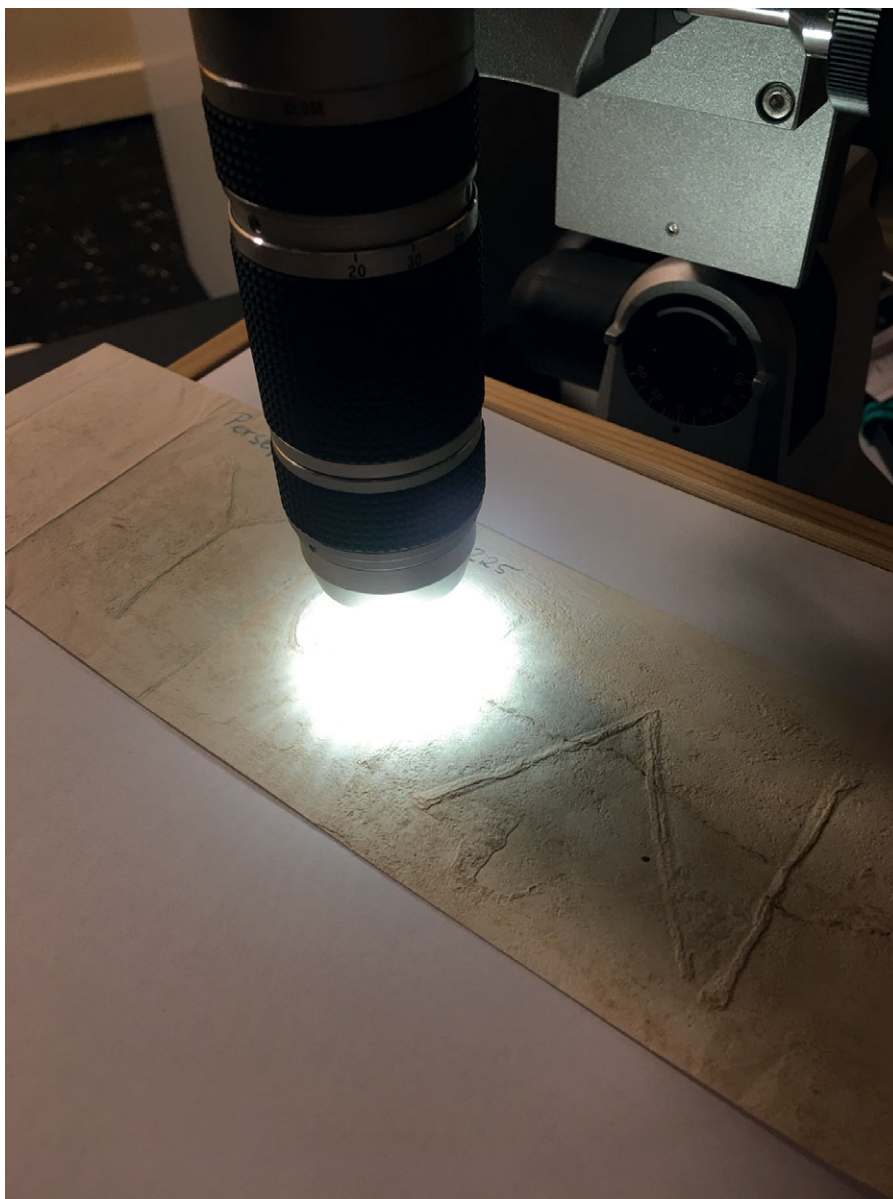
We have two very brief notes of the actual squeeze-taking process for 1923 and 1933.⁴⁸ In November 1923 Herzfeld used wet squeezing to copy inscriptions by beating a sheet of soaked paper into every crevice and hollow of the surface, then peeling off the paper. Once it had dried the resulting impression was, however, not only a negative mirror-image record preserving the inscription at actual size, but it was also, unintentionally, the receptacle for pigments that must have been embedded in the carved cuneiform characters and stripped off in the squeeze-making process. We have no indication in the archival materials that Herzfeld ever commented on this, but the squeezes from Herzfeld's work at Naqsh-e Rostam, which partly preserve pigments of the inscriptions, are today in the Herzfeld Archive in the National Museum of Asian Art, Smithsonian Institution.⁴⁹

It is indeed surprising that the pigments survived the papier-mâché squeezing. As already mentioned, Herzfeld did not comment on the pigments that came off in the squeeze process, yet they are visible on many squeezes, and ironically they provide additional proof for us today that these inscriptions were indeed colored in blue. Moreover, the pigments captured on Herzfeld's squeezes offer further proof that pigments can be lost during the process of mold-making and squeezing. Although it has been repeatedly stressed that the process of casting does not remove traces of paint,⁵⁰ the doubts of many

⁴⁷ These casts, today in Berlin, are referred to in correspondence between Herzfeld and Von der Schulenburg in November 1925 the author is currently working on.

⁴⁸ Ernst Herzfeld Papers, National Museum of Asian Art, Smithsonian Institution, Washington, DC, N-84 (1923-4), November 22, 1923, p. 18: "I did them all with cigarette paper, folded three times. The result is good." Busse, assisting Herzfeld in 1933 in a letter to his father (September 23, 1933, 4): "We had made casts, . . ., one takes enough large sheets of extremely thin cigarette paper, that is carefully hammered on with a hard brush, while damp. When it is well molded to the form, new layers are progressively overlaid . . . Once it is dry one can lift off the paper layer, which is now firmly stuck together, and one has an exact reproduction of the original." Another letter to his father from August 15, 1934 refers to the squeezes made at Naqsh-e Rostam. Fifty-seven of these squeezes including parts of the Old Persian, Elamite, and Babylonian version, are today among the Ernst Herzfeld Papers, National Museum of Asian Art, Smithsonian Institution, Washington, DC: Herzfeld Archives Subseries 6.3 (cuneiform scripts). Blueprints of squeezes of further inscriptions from Naqsh-e Rostam are kept in the National Museum of Asian Art Archives. Herzfeld Archives Subseries 6.4 nos. 114-25. It may well be that these were the photographs taken by Busse in August 1934.

⁴⁹ Hennessey 1992, 134. ⁵⁰ E.g. for Greek Art: Jenkins 1990, 194-7; Jenkins 2001, 17.



4.3. Paper squeeze from the Frataraka Complex at Persepolis, Akademie der Wissenschaften, Berlin, under the microscope, June 2022. Photo: Author

conservation experts have been repeatedly substantiated by traces of paint adhering to squeezes and molds.

Squeezes continued to be taken from the inscribed monuments on the Takht. A series of paper squeezes taken from stone inscriptions discovered in the so-called Frataraka complex to the north-west of the Persepolis Takht likely produced shortly after their discovery in 1932 remains in Berlin and in Chicago (**Figures 4.3** and **4.4**). The squeezes became so valuable that they were photographed. In



4.4. Microscopic image of ultramarine blue pigments from a paper squeeze (Figure 4.3). Photo: Author

August 1934, Hans von Busse mentioned some fifty sheets of squeezes measuring 60×80 cm each, which he photographed.⁵¹ In retrospect, it is striking and almost paradoxical to read the words of Herzfeld from a lecture held in Tehran on August 13, 1925: “To prevent the vandalizing of historical remains, the government should establish appropriate regulations, and forbid the destruction of historical monuments. . . . One should get the people interested in their national heritage and its *preservation*” [emphasis mine].⁵²

Although Herzfeld professed keen interest in the preservation and documentation of the ruins of Iranian sites and was the architect of legislation to protect Iranian antiquities, he remained apparently oblivious to issues of conservation that had already become well-appreciated for ancient architectural monuments in the Western Hemisphere.

In a lecture in May 1927, Mohammad Ali Foroughi (1877–1942), minister at the Persian court, lamented after he had seen Pasargadae and Persepolis that

⁵¹ The present location of these squeezes is unclear. Blueprints of squeezes of inscriptions from the Great Old Persian inscription on the Takht’s south façade, as well as from inscriptions on the Apadana, Palace of Darius and Palace of Artaxerxes are kept in the Herzfeld Archives in the National Museum of Asian Art, Washington, DC, nos. 60–113. It may well be that these were the photographs taken by Busse in August 1934.

⁵² Trans. Mousavi 2005, 450–1.

“all the calamities that could have happened to it have already happened. *Both the inscriptions and the decorations are gone*. Only the wonders of the time remain, and they must be preserved” [emphasis mine].⁵³ Some six years earlier, and inspired in part by Herzfeld’s activities, the future Shah Reza Khan had organized a “Society for National Heritage.”⁵⁴ After he had visited Persepolis in the fall of 1922, he had complained about the poor condition of the ruins.⁵⁵ Herzfeld’s original plan for the monuments on the Takht was, therefore, strongly focused on “conservation.”⁵⁶ He explicitly named two sets of reasons for the lamentable state of the site: the fire caused in the sacking by Alexander of Macedon and damage from earthquakes, water, plants, and human impact (“secondary reasons”).⁵⁷ He suggested various measures that ought to be employed on the site, including that: “large stones still standing must be protected on their upper surface by a thin layer of cement, or if we cannot get real cement, any material which may replace it. The cracks within the large blocks must be treated in the same way.”⁵⁸

Conservation of the monuments on the Takht was repeatedly emphasized and advertised. Even in 1933, Herzfeld stated that one of the main aims was the preservation of the architectural sculpture and “protection against damage by rain, frost and man.”⁵⁹ It is not clear whether Herzfeld or Schmidt after him

⁵³ Trans. Grigor 2004, 35; further parts of his lecture in Mousavi 2005, 457–8. The first Royal Museum in Tehran was constructed in 1876. Already before 1914, the first Iranian Antiquities Service was created and, in March 1917, a new Museum of Antiquities in Tehran was opened in the basement of the Ministry of Public Works. It was open to the public three days in the week (Hodjat 1995; Mousavi 2005, 448–9; Nasiri-Moghaddam 2002, 290–309).

⁵⁴ The various names of this institution such as “Society for the Protection of National Monuments” or “Committee for the Preservation of National Heritage” bear interesting insights into the semantics of wording: Grigor 2004, 17 n. 1; Grigor 2005b; Mousavi 2005, 449–50.

⁵⁵ Mousavi 2005, 458.

⁵⁶ Herzfeld 1928. At the same time, it shows how little interest there was in conserving traces of the surface. In retrospect, it can only be lamented that the interest in the “protection” of the stone monuments did not play any role, although various publications and institutions were in place: e.g. Lucas 1924; Rathgen 1898 (Engl. 1905); Rhousopoulos 1911. This should be a lesson that interdisciplinary research is not only appropriate but obliged by all means.

⁵⁷ Herzfeld 1928, 20: “Enfin, récemment, les voyageurs soi-disant scientifiques, enlevaient des pièces de sculptures avec leurs mains sacrilèges, pour les ensevelir dans les musées d’Europe.” (“Finally, in more recent times, self-declared scientist travelers, who removed pieces of sculpture with their sacrilegious hands, to bury them in the museums of Europe.”)

⁵⁸ “Les grandes pierres encore debout doivent être protégées sur leur surface supérieure par une mince couche de ciment, ou, si l’on ne peut se procurer de vrai ciment, par quelque matériel qui peut le remplacer. Les fissures des grands blocs aussi doivent être traitées avec engouement. Il semble être à propos de donner un petit profil saillant à cette couche supérieure pour empêcher les eaux de couler en bas et de toucher la surface des bas-reliefs” (Herzfeld 1928, 21).

⁵⁹ Herzfeld 1933: 407. As Mousavi has already stated, however, “It is not clear how the initial work of preservation and restoration was subsequently transformed into a real archaeological excavation” (Mousavi 2002, 225).

made certain that there was a conservator present during the excavations conducted from 1931 to 1939. The preserved records do not indicate the presence of any such staff member. As we read in the preface to Schmidt's final excavation publication, "damaged columns and other stone parts of the structures were expertly repaired and partly restored in reinforced cement" by Signor Dante.⁶⁰

The omission of any discussion of the earlier pillaging, and the lack of commentary on conservation efforts, were addressed in a review by Barnett of the first excavation volume on Persepolis, who also commented that it "is strange that the excavators have not attempted this relatively simple task [to identify the dispersed sculptures from Persepolis in Western museums]."⁶¹

It is also interesting that, although Herzfeld enthusiastically wrote to Breasted about his discoveries of the paint on several façades, he obviously did not even try to initiate any investigation, however preliminary, of the pigments preserved on these surfaces.

CLEANING, RESTORATION, CONSOLIDATION

Cleaning efforts on the site began with the fieldwork of Herzfeld and the Oriental Institute. Photographs of "cleaning" during the excavation seasons with European foreman in charge show workmen with brushes and sponges (**Figures 4.1 and 4.2**). While not explicitly stated in other preserved records, a documentary movie produced for 1935 shows workers involved in cleaning the reliefs.⁶²

As previously noted, it was the sculpted reliefs on the north façade of the Apadana that suffered most. As the entire north façade was the most exposed to weather conditions, and repeated mold-making was done on this façade, traces of paint are, understandably, hardest to find there now. To protect the site from repeated pilfering, in November 1930, Iran implemented a law regarding the preservation of national antiquities. It became strictly forbidden to export any objects out of the country without government permission. The practice had been common in the previous decades and is the reason for the presence of many reliefs in collections outside Iran.⁶³

Following the era of Herzfeld and Schmidt, Iranians were actively beginning to supervise fieldwork at the site. Hossein Ravanbod, director of the

⁶⁰ Schmidt 1953, x. ⁶¹ Barnett 1957, 57, 60.

⁶² Institute for the Study of Ancient Cultures Chicago, "The Human Adventure" (1935) YouTube Video, 1:02:43, October 4, 2010, www.youtube.com/watch?v=yysHJkov5XA&t=1s at min. 55:20. A set of photographs at the International Association of Mediterranean and Oriental Studies (ISMEO) archives in Rome present further evidence of cleaning of the reliefs.

⁶³ Wawrzyniak 2008, 48. Between 2003 and 2018, antiquities from Persepolis were embroiled in a bizarre legal claim that has reached the U.S. District Court (Fincham 2007).



4.5. Roof above eastern façade of Apadana, constructed in 1952. Photographer unknown. Photo: Alamy Stock Photo

excavations in 1939 was followed by Ali Sami, who not only established the “Scientific Institute of Takht e Jamshid” in 1941 but also worked on the site until 1961. He became a professor at the Pahlavi University in Shiraz in 1962.⁶⁴ Under Sami, work took place in front of and in the Hall of 100 Columns. Between 1955 and 1957 he completed work in front of the tomb of Artaxerxes II with the support of archaeological inspectors like Ali Hakemi.⁶⁵ Once the Iranian team had complete responsibility for the caretaking of the monuments, in 1952 a roof was constructed to protect the eastern façade of the Apadana from the repeated impact of weathering like sun, rain, or snow (**Figures 4.5 and 4.6**).⁶⁶

The years between 1965 and 1979 produced a remarkable body of work and documentation in the fields of conservation and technical studies on the site.

⁶⁴ Mousavi 2012.

⁶⁵ Between 1949 and 1951 Sami also conducted excavations in Pasargadae.

⁶⁶ Khiabani 2004; Mousavi 2002, 245.



4.6. Protective roof, constructed in the 1990's, above the eastern façade of the Apadana or Audience Hall, 2009. Photo: Author

Over the long history of Italian work in Persepolis, various methods were tested on how to strengthen and to stabilize the relief surfaces. A 1965 photograph shows a series of tests of a special wax extract on the eastern Apadana reliefs.⁶⁷ The Italian restoration program included the training of Iranian conservation specialists on the site. Once the Italian methods for conservation and documentation were established, they were continued by Hassan Rahsaz, who became the director of the conservation programs carried out on the site following the 1979 Iranian Revolution.

It is not clear how much restoration work was done with the inauguration of the “Institute of Achaemenid Research”, founded at Persepolis in 1974 by Alireza Shapur Shahbazi (1942–2006). We do know, however, that in 1998, the UNESCO World Heritage Foundation (WHF) co-sponsored the training of stone conservators on site.⁶⁸ Documentation, combining sophisticated conservation methods and research into the composition and technology of materials, however, is fairly recent. It was made possible only through the

⁶⁷ IsIAO Archive (ISMEO), Rome, Neg. R. 3379/5 (–C.C. 65/11). Often, materials used in previous conservation treatments will have left some traces. This is attested for other ancient surfaces treated in the last two centuries (e.g. Parker 2008).

⁶⁸ “Application of the World Heritage Convention by the States Parties, Periodic Reporting Cycle 1, Section I: Iran,” 2003, <http://whc.unesco.org/archive/periodicreporting/apa/cycle01/section1/ir-summary.pdf>

efforts of the Parsa-Pasargadae Research Foundation, which has its own Architectural Conservation and Restoration Group.⁶⁹ Today, the tradition of training Iranian students in archaeological conservation at Persepolis continues.

Between 2001 and 2005, a conservation and restoration project at the Tomb of Darius I was conducted under the auspices of Rahsaz, primary consultant of the Architectural Conservation and Restoration Group.⁷⁰ The first phase of the operation comprised a six-month survey period aimed at taking careful rescue measurements of the façade and documenting damage to all parts of the surfaces severely compromised by natural erosion and humidity. A thorough examination, followed by a complete inventory and reassessment of the causes of decay and damage identification, was the primary goal of the preparatory period. A basic preservation concept for the tomb façade was worked out, with guidelines and procedures for restoration and documentation. Natural erosion, pollution, and humidity caused by nearby agricultural activities, along with changing weather conditions, have resulted in heavy incrustations on the surfaces of the façade. The greatest cause of concern was erosion that had formed its way through the entire part directly to the right of the central figure of Darius I in the top register. Water, which originally would have dropped off the edges of the top register of the façade, eventually caused washouts in the elaborately carved surface. Plant growth covered some parts of the façade. Humidity retained in the plants and vegetation caused damage to the surface of the rock, while their roots caused the stone to split in some parts. Finally, rainwater damage has resulted in an almost amorphous appearance of the sculpted forms on some parts of the façade, especially on the left of the top register, where fissures have penetrated the surface of the rock itself.

During the surface cleaning of the sculpted façade not only were rich traces of polychromy revealed, but also important insights into the history of the monument itself were gained. Directly above the tomb's façade, for instance, a previously undocumented area of drainage channels was found. These channels were probably cut into the rock sometime during the preparations for the carving of the façade relief, probably in the early phases. The architects working under the Achaemenid rulers were thus aware of the cracks in the natural rock and built channels to divert the rainwater, preventing it from flowing into the cracks. Such preventive measures demonstrate the high technical standards and knowledge of the Achaemenid craftsmen.⁷¹ Closer

⁶⁹ E.g. Talebian 2007.

⁷⁰ In order to give access to the façade, a 50 m steel-tube-coupling scaffolding was constructed. According to Schmidt, the original height from the bottom to the top of the cliff was about 64 m (Schmidt 1970, 80). The distance between a visitor and the foot of the façade, today about 6 m, would have been approximately 2 times the size in the fifth century BCE.

⁷¹ Nagel and Rahsaz 2010. A drainage system of channels was also found inside the tomb chamber. Over time these channels clogged and allowed water to attack the tomb's carved

inspection of the façade uncovered surprising information about the actual process of carving the sculptures. In addition to tools such as a flat chisel, toothed chisel, and claw chisel, a pointed hammer was also used. Close examination, yet not published in written form by Rahsaz, also revealed that some parts of the tomb underwent restoration in antiquity. At some unknown point, parts of the head, including the face, of the winged figure in the top register were stabilized with a clamp. A hole to the left of this figure was refilled in antiquity. The face of Darius I himself also underwent restoration in antiquity. Overall, ancient restoration work seems limited to the top register of the tomb façade.

The monuments on the Takht continue to be exposed to the environmental elements causing threats to their survival. A recent study has documented the present state of biodeterioration on the Apadana's northern façade reliefs.⁷² As the site is on the itinerary of almost every visitor to Iran, it faces serious challenges. As of summer 2009, glass façades were placed in front of fragile components. A new diagnostic survey was carried out in September and October 2008 in order to determine the influences caused by atmospheric pollution. It will eventually lead to new ways of integrating modern conservation techniques, as the main goal will be preventive conservation, not restoration.⁷³ With sophisticated methods and advanced modern analysis the caretaking of the monuments on the site has become a truly transdisciplinary collaboration.

THE TWO STONE BULLS IN THE PORTICO OF THE HALL OF 100 COLUMNS

Although we should not judge early efforts and treatments of the sculptures of Persepolitan monuments by today's standards of conservation and its modes of documentation, the modern history of two colossal bulls from the Hall of 100 Columns presents an interesting episode in the history of the treatment of archaeological materials in museums. In the debris in front of the northern portico of the Hall, two colossal stone bull heads were

façade and the interior. As a result of the new conservation work, these channels were cleaned. The channels above the tomb's façade were directed toward the channels running parallel to the tomb façade, already existing in the early Achaemenid period. The cracks and splits of these channels were filled with a mixture of lime extract, sand, and appropriate materials, which were reversible and allowed for stabilization. All conservation work was documented and photographed.

⁷² Mohammadi and Krumbein 2008.

⁷³ Domasłowski 2008; Guidi et al. 2008; Leatherbarrow and Mostafavi 1993, 2002; Petzet 2003; Snethlage 2008.

excavated by Herzfeld in 1932, the bodies of which had been in situ for centuries before.⁷⁴

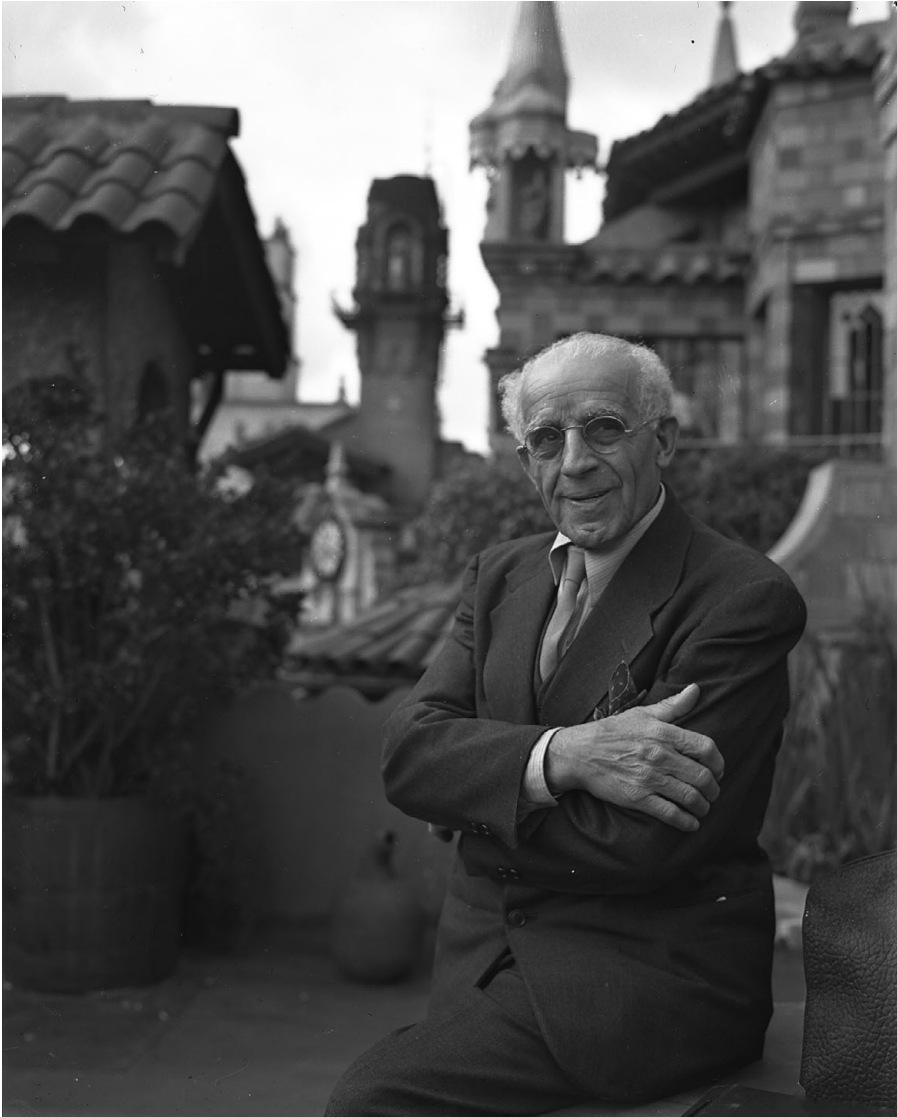
The heads of the stone bulls were excavated in front of their original positions on the *anta*, the angles leading to the portico, where they had fallen off at an unknown time. Standing originally some 63 m apart, the bulls – each some 6 m in height – had flanked the sides of the portico, mirroring each other in guarding the entrance to the hall’s portico. In their original position, each was elevated on a separate stone socle. The stone surface of the western bull’s head, which is in situ, appears today remarkably different from the heavily restored and polished head, brought to the Oriental Institute in Chicago after negotiations with the Iranian government in 1936.⁷⁵ A series of photographs preserved in the University of Chicago Library, Special Collections Research Center shows how the eastern bull’s head fragments, once they arrived in Chicago, were “restored” by the Italian sculptor-restorer Donato Bastiani (1869–1953), presumably with the intention to resemble an “authentic” original appearance (**Figures 4.7 and 4.8**).⁷⁶ Bastiani, who became an experienced restorer at the Institute for the Study of Ancient Cultures Museum in his advanced age, remains a key figure in understanding what happened to the monuments from Persepolis in Chicago. Photographs showing the eastern head at the time of excavation and then at the time it was first installed in Chicago show the heavy restoration, but it is, at present, unclear which methods Bastiani employed. Future research in the archives of the department of conservation of the Institute for the Study of Ancient Cultures may possibly yield further information about the specific techniques used. It is clear, though, that no remains of pigments whatsoever are preserved. While the Chicago head appears almost black due to its modern treatment, the one still in Persepolis, as restored to its original position by Giuseppe Tilia in May 1967, is of a bright gray appearance.⁷⁷ Furthermore, the head in Persepolis preserves abundant traces of polychromy. For unknown reasons, however, Tilia neither recorded nor commented on any traces of paint visible on the head.

My own close inspection of the head of the western bull in Persepolis in 2007 and 2009 revealed that the skin preserves a layer of blue paint. In some areas, this layer is up to 1 mm thick, while in others only faint traces can be observed (**Figures 4.9–4.16**). The pigment is very shiny, almost glassy in

⁷⁴ Nagel 2020. ⁷⁵ Alizadeh 2017; Kantor 1985. University of Chicago, OIM Inv. A 24065.

⁷⁶ On Bastiani: Nagel 2020, esp. 116–23. I am grateful for many discussions with Laura D’Alessandro and Alison Whyte from the Institute for the Study of Ancient Cultures Museum at the University of Chicago. On the history of the museum: Teeter 2019. The complex history of the restoration of fragments from Susa and Persepolis in museums around the world deserves more scrutiny in research. Bastiani’s work followed the work of the restorers at the Louvre and elsewhere. The bull capital from Susa in the Louvre is itself largely a nineteenth-century pastiche creation with original fragments.

⁷⁷ Tilia 1972, 49–50, figures 99–103, plates XLIV–XLVI; Zander 1968, 41, figures 97, 99.

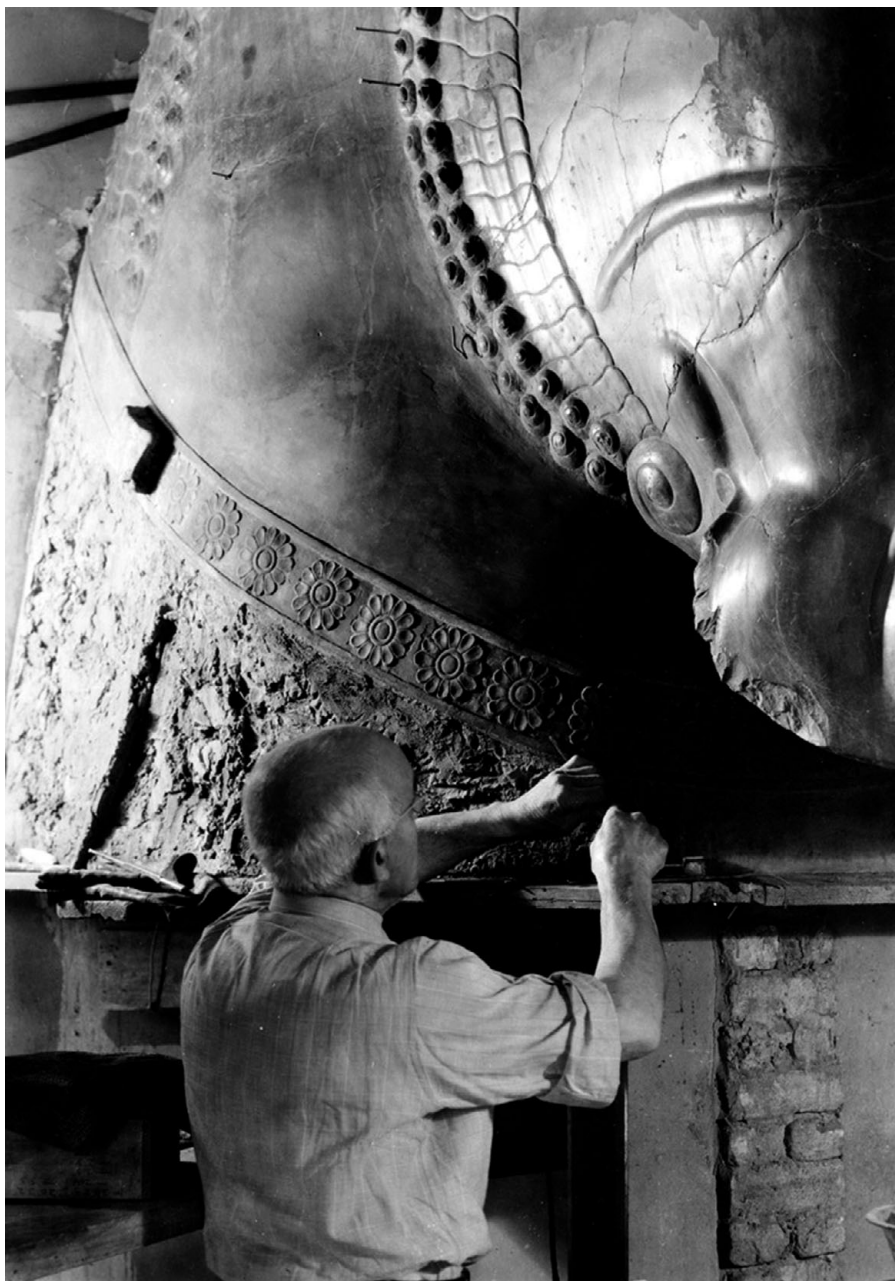


4.7. Donato Bastiani (1869–1953), a sculptor-restorer who worked on the fragments from Persepolis after they arrived at the University of Chicago. University of California, Riverside Libraries, Special Collections & University Archives, Avery Edwin Photographs Collection

appearance. Macro photography reveals that the pigments appear flaky.⁷⁸ It is likely that a semivitreous substance like Egyptian blue had been prepared for the surface coating. The good state of preservation permits the reconstruction of parts of the surface of the bull's head as blue. A miniature bull excavated at Susa and today in the Louvre still preserves traces of blue paint.⁷⁹ Pigments are also found in the nostrils of the western bull. The left eyeball preserves

⁷⁸ No samples were taken for analysis: Nagel 2020.

⁷⁹ Louvre, SB 3658 = X 115.



4.8. Bastiani working on the restoration of a bull monument from Persepolis in the Museum of the Institute for the Study of Ancient Cultures in Chicago. University of Chicago Library, Special Collections Research Center, photographer unknown, apf3-01716

abundant traces of a red pigment (ochre). The same red pigment can be found in the tear duct and on the eyelids of other bulls at Persepolis.⁸⁰ Other than

⁸⁰ Tilia 1978.



4.9. Portico, western *anta*, Hall of 100 Columns. Photo: World History Archive/Alamy Stock Photo



4.10. Reconstructed head of bull, portico, western *anta*, Hall of 100 Columns, 2016. Photo: Julian Decyk



4.11. Head of bull, portico, western *anta*, Hall of 100 Columns, in situ, detail, 2008. Photo: Author



4.12. Head of bull, portico, western *anta*, Hall of 100 Columns, in situ, detail, 2008. Photo: Author

that, traces of paint have yet to be documented in more detail on the western bull. Further finds from the portico attest to the abundance of polychromy in this part of the terrace. Among the notable finds in the portico, excavated by Schmidt in 1936 near the colossal western bull, was a fragment of small limestone teeth with traces of a reddish pigment, which must have originally belonged to another zoomorphic sculpture.⁸¹

It must be noted, therefore, that conservation studies should not be restricted to the monuments on the site. During my research it became very clear that even in the museums little documentation about earlier treatments of Persepolitan reliefs have been kept. In some museums, such as the Kaiser Friedrich Museum in Berlin, the tradition of mold-making continued. Reliefs were cleaned and often so heavily restored and treated that any search for remaining paint traces will be hampered. The colossal Persepolitan artifacts today housed in the Institute for the Study of Ancient Cultures Museum at Chicago, were heavily treated by the Italian restorer Donato Bastiani in the late 1930s. Furthermore, not only the treatment, but even the display methods and

⁸¹ OIM A 23408 = PT 4 1105; Schmidt 1957, plate 41: 18.



4.13. Head of bull, portico, western *anta*, Hall of 100 Columns, in situ, detail, 2008. Photo: Author

exposure to museum conditions present their own challenges to archaeological objects.⁸²

Many of the most recent studies stress the impact of atmospheric pollution, salt crystallization, and biodeterioration on the surface of monuments. Under the auspices of the Parsa-Pasargadae Research Foundation, new scientific programs have targeted the preservation and conservation of the structures on the platform. As mentioned above, It is under the new conservation program initiated by the Parsa-Pasargadae Research Foundation in 2009 that some façades have been protected by glass. Despite their survival, the stone sculptures and reliefs in situ can only be considered to be moderately in a good state of preservation. Weathering and deterioration can be observed, and there is evidence of flaking along with cracks running through many of the stone reliefs. Original sculpted features are unrecognizable in many areas. As stated previously, remains of paint layers are especially sensitive and react poorly when unearthed.

⁸² E.g. Eibner 1911; Scott 1921–6.



4.14. Head of bull, portico, western *anta*, Hall of 100 Columns, in situ, detail, 2008. Photo: Author

ASPECTS OF PRESERVATION AT SUSA

The situation of conservation efforts and restoration during modern interventions at Persepolis is complex, but in many respects we have more information than we have for the other major Achaemenid sites discussed in this book. As Susa was almost exclusively a French project, both material and documentation



4.15. Head of bull, portico, western *anta*, Hall of 100 Columns, in situ, detail, 2008. Photo: Author

were spread between Iran and Paris.⁸³ Almost nothing is known about the treatment or conservation efforts on the site conducted when the French were working actively there. In fact, the preservation and protection of the heritage

⁸³ E.g. Abdi 1994; Chevalier 1997; Mousavi 1996; Nasiri-Moghaddam 2002, 2004. In 1895, the French obtained an exclusive right to conduct excavations in Persia. The treaty was renewed in 1900 and remained active until 1930.



4.16. Nostril of head of bull, portico, western *anta*, Hall of 100 Columns, in situ, 2008. Photo: Author

of Susa are causing challenges not only on the site but also in museums charged with stewardship of exported materials. As a note in the conservation report accompanying the 1992 exhibition catalog “The Royal City of Susa” revealed, it was difficult to find out exactly when, how, and by whom earlier restorations were undertaken in Paris on Achaemenid brick fragments.⁸⁴ Lamenting the insufficient documentation, Bourgeois found evidence that the bricks were treated with *spermaceti*, and that between 1920 and 1940, one G. Le Batard, a “very seriously disabled veteran”⁸⁵ became responsible for the restoration. Did Le Batard work on all excavated material brought from Susa to Paris?

Furthermore, between 1950 and 1960 extensive restoration of Achaemenid brick panels took place in a marble-cutter’s workshop in Paris. Approximately 950 fragments of glazed bricks were cleaned, inventoried, and photographed in Versailles in 1991 to 1992, and then repositioned in new displays by the

⁸⁴ Bourgeois and de Lapérouse 1992, 281, 284. In the author’s words: “While the discovery of glazed bricks from the Achaemenid period is a recurring motif in the writings of archaeological digging in Susa, the different stages of their successive restorations have fallen into oblivion.”

⁸⁵ *Ibid.*, 285.

restorer Michel Bourbon.⁸⁶ Parts of these facades went on display in 1995.⁸⁷ These recent reconstructions of conservation episodes revealed interesting results. For instance, it was determined that the surface layer of the glazed bricks with the low relief decoration was in several cases molded separately with a different clay layer, which gives interesting insight into the working technique of polychromy in glazed brick.⁸⁸

Little information has been published on the actual conservation work at Susa.⁸⁹ In a recent multiauthored paper on the state of preservation of the monuments at Susa, Iranian scholars have discussed past and present efforts to save Susa from further deterioration.⁹⁰ Zareh, stressing the importance of the site, stated “that when people have no understanding or appreciation of older periods of culture, and even no knowledge of some of the more recent ones, they are in no position to protect their cultural heritage.”⁹¹ According to Abdi, the preservation of Susa is not only the duty of the government, but also that of every individual in Iran.⁹² He admits that, given the extent of Susa, it is impossible for the Ministry of Cultural Heritage alone to protect the site, and that it is critical for every Iranian, especially those living in Susa, to participate in the protection and preservation of the site. Abdi maintains that it is critical to preserve and protect Susa and deliver it to the next generation. An anonymous author in the same article comments that the French, who left after the Islamic Revolution but have returned now for collaborative efforts, find the conditions of the site to be dire. Apparently, the Louvre is trying to assist in the refurbishment of the local museum; but despite this, the anonymous author is critical of the Louvre for not welcoming Iranian students and archaeologists and encouraging them to study relevant works in Paris.⁹³ The modern history and historiographic burdens of archaeology continue to present challenges to the advancement of open channels of communication and to a furtherance of truly collaborative inquiry into the important project of studying the polychromy of the Achaemenid Persian Empire.

⁸⁶ Caubet 1997, 101.

⁸⁷ André-Salvini 2013, 299; André-Salvini and Borbon 2000; Caubet and Kaczmaryk 1998.

⁸⁸ Daucé 2013, 307–13. ⁸⁹ Perrot 2013, 236–8. ⁹⁰ Abdi et al. 2009. ⁹¹ Ibid., 8–9.

⁹² Ibid., 12. ⁹³ Ibid., 22.



5.1. Raw lapis lazuli was excavated at many sites throughout Iran. There are great quantities of raw lapis, especially at Shahr-e Sokhta in Eastern Iran and in Susa in Khuzestan. The fragments depicted here were excavated under Jacques de Morgan (1857–1924) at Susa. Musée du Louvre, Paris. Oriental Antiquities, SB23957. Photo: © Musée du Louvre, Dist. RMN-Grand Palais/Philippe Fuzeau/Art Resource, NY

CHAPTER FIVE

A DISCUSSION: ASPECTS OF NONVERBAL COMMUNICATION IN THE ACHAEMENID PERSIAN EMPIRE

In the preceding chapters, the focus has been on documenting traces of polychromy and on related matters of historiography, archaeology, and conservation. This chapter is an attempt to explain why knowledge of polychromy in the Achaemenid Persian Empire matters when studying Achaemenid Persian history. This chapter will show that systematic strategies for studying and analyzing pigments and polychromy in Persepolis and other heartland Achaemenid sites are not merely ends in themselves. Although important, they are not merely strategies of data development relevant to documentation in the practice of field archaeology and site conservation. The study of polychromy has the potential to greatly enhance our appreciation of the meanings of the Achaemenid visual vocabulary and culture. And because the Achaemenid Persian Empire was so vast and so interconnected with the cultures within and contiguous to it, analyses of Achaemenid polychromy are critical ultimately to our growing understanding of polychromy throughout the greater Mediterranean region. According to Diana Young, colors “animate things in a variety of ways, evoking space, emitting brilliance, endow[ing] things with an aura of energy and light.”¹ Polychromy is, therefore, a key feature in concepts supporting an *anthropology of luminosity*, since the very material components of color are elements of the light source itself, while it is part of the Mineral Universe these palatial sites represented.²

¹ Young 2006, 173.

² Bille and Sorensen 2007; Nagel 2019.

This chapter also extends a discussion that has received much attention, following Root's groundbreaking monograph on the importance of understanding the official art of the Achaemenid Empire ("Achaemenid art" in her definition) as a program carefully and knowledgeably created to project an ideology of kingship.³ If it is true that Achaemenid rulers sought to legitimize their power by various means, including art and its iconography, how do pigments and related architectural finishes, as part of that representational reality, fit into the message of such a program? This question was not addressed by Root, but the time has come to undertake such a task. Furthermore, Root's definition of an imperial program was one that allowed variant visual languages in different regions of the empire. It now invites us to consider the question of how polychromy worked within that larger project. If Achaemenid palaces in the Iranian heartland were microcosms of imperial polychromy and paint, how can we imagine the processes of deliberation and labor that produced these different microcosms? This chapter also discusses issues of artistic practice and patronage in the imperial program as they relate to Persepolis and Susa – practices and systems that led to the production of the lavishly polychrome built environments. It then offers preliminary ideas about *interpreting* the evidence assembled in the documentary chapters on the polychromy of Achaemenid Persia. These ideas, however, represent only the first step toward a long-term goal aiming to move us beyond the notion that colorful surface decoration was *merely* decorative in order to pursue polychromy as an integral element of the symbolic content and impact of the court environment. A case can be made for a far more complicated and nuanced set of meanings for the polychromy of the Achaemenid court than the notion of a purely decorative function allows.

THE HOUSE OF PAINT: EMPIRE-WIDE LABOR AND INTERCONNECTED CRAFT TRADITIONS

The rich textual corpora of the Persepolis Fortification and Treasury tablets, found on the Takht in 1933 and 1936 respectively, have helped us tremendously in reconstructing aspects of the socioeconomic history of life in the Persian heartland. These administrative records provide data on the bundling of work resources and many aspects of daily business at the imperial center in the late sixth and early fifth centuries BCE. Our knowledge has improved steadily in recent years, as these sources continue to receive attention.⁴ These

³ Jacobs 2021b; Root 1979, esp. 1–45.

⁴ Fortification tablets: Briant et al. 2008 with vast bibliography; Hallock 1969; Henkelman 2008, 2013, 2017a. For the seals on the tablets and related issues: Garrison and Root 2001. Treasury tablets (texts): Cameron 1948.

texts provide evidence of labor forces brought to Persepolis from all over the empire to work on the construction of this imperial capital. The royal administrative texts, that is, the Susa Foundation Charters (notably DSf), however, are documents of imperial display that reinforce in rhetorical terms the sense of an “international labor force” that we receive in reliable laconic terms from the disbursement records of Persepolis.⁵ The phenomenon is rich in ancient precedent.⁶ There is a wealth of texts available from Babylon under Achaemenid rulers, where the Persian elite owned land and businesses including businesses in technology and construction.⁷

Achaemenid Persian art was certainly planned at the highest level of court patronage, making strategic use of guidance from regional informants.⁸ The art was executed by teams of artisans who came from near and far, bringing with them multiple traditions of artistic practice. The crafting of polychromies at Persepolis and Susa must be understood within this scenario. Craftsmen and -women traveled, providing their services to rulers, with force or not. Goossens, Nylander, and Uchitel have summarized the evidence for foreign workers at the Takht, specifically, and have come to the same conclusions. The epigraphic evidence from Persepolis documents North African, Babylonian, Indian, and Ionian craftsmen involved in the shaping and decorating of Achaemenid architecture.⁹ The administrative tablets from Persepolis provide a clear image of an ethnically mixed population working in Persepolis.¹⁰ Many workers who have been involved in the construction are mentioned on travel-ration texts. They came from the east, such as Bactria and India; other crews came from Assyria, Babylon, Egypt, Ionia, and elsewhere to the west.¹¹

Henkelman had summarized the evidence for Egyptians who may have been part of the workforce of construction workers and craftsmen and -women at Persepolis, and these included painters.¹² These Persepolis Fortification Tablets date from the reigning years 20 to 25 of Darius I, corresponding to our conventional time between 502/1 and 497/6 BCE. The term *Kursura Rabbaka*

⁵ Basello 2018. ⁶ Zaccagnini 1983. ⁷ Zawadski 2021. ⁸ Root 1979.

⁹ Goossens 1949; Nylander 1968; Uchitel 1991; On testimonies for Africans in the first millennium BCE context now Karlsson 2022. There is a long tradition of movements of people and goods across the continents from Africa and Asia.

¹⁰ E.g. Henkelman and Stolper 2009.

¹¹ Hallock 1969, 6; Henkelman and Kleber 2007; Jursa 2015 (Babylonia as part of Persia).

¹² Henkelman 2017b, esp. 39 and 282–3. See Chapter 1. Traveling Egyptian painters are also mentioned in NN 1177 (vs. 1117 mentioned by H.). I owe this information to Matthew Stolper. Tablet NN 1922 refers to Egyptian stonemasons traveling from Susa to Tamukkan (Borazjan) or Persepolis, and a contingent of 690 (!) Egyptian stonemasons are traveling from Persepolis to Tamukkan (Borazjan) in 499 BCE (Tablet NN 480). Aside from Fort. 2341–106, other unpublished texts from the Persepolis Fortification Tablets refer to Egyptian craftsmen, similar to PF 1110 and 1111. On craftsmen from Egypt in Persepolis, see, now Zehbari 2021. On the material evidence for Egyptians and North Africans in Achaemenid Persia, see, now, Qaheri 2020.

has been translated as “Conscripted Painters/Decorators.” Such painters or decorators are referred to 12 times in PFT (PF 1007, NN 1313, NN 1321, NN 1341, NN 2102, NN 2439 [all at Kaupirriš, modern Kāmfīrūz, about 110 km northwest of Persepolis.]); in Matannan (NN 1876; estate of Irtaštuna, wife of Darius); PF 1110 and PF 1111 (at Itema); PF 1169 (no place name), NN 0898 (female painters; no place name); NN 1177 (Egyptian painters traveling on the royal road).¹³ The administrative documents supply the most reliable textual evidence, but literary sources reinforce their testimony.¹⁴ All this evidence indicates that in our investigations of working methods relating to polychromy, judicious recourse to analogy from these other areas is appropriate.

In the Achaemenid palaces, it is quite certain that the carvers and workers associated with them prepared parts of the surface for paint application. The connection between the sculptors and those preparing the ground for the painters must have been a very close one.¹⁵ There is evidence of careful preparation by the sculptor of the surfaces that were to receive separately attached ears, horns, crowns, beards, and other elements. In the case of some relief sculptures, details that are fully carved in some areas were sometimes left uncarved in parallel areas elsewhere on the same monument. The various craftsmen who built and decorated the monuments were, therefore, part of a collaborative network. Without drawing too close parallels, one wonders whether the situation is similar to that at the Qajar court, for which there is evidence of combined knowledge of court builder and painter.¹⁶

This network had to operate on many levels. The imperial capital at Persepolis was intended by its patrons and planners to address a multicultural audience of a vast empire; the craftsmen who executed this program performed in a setting of multilingual and multicultural activity. Within this multicultural community of production, the efforts of masons, sculptors, painters, and gilders required interactive participation. When we think along the lines of modern migration studies, we come closer to the realities of the major building projects that occurred between the late sixth and mid-fourth

¹³ Henkelman and Kleber 2007; on female workers in Persepolis, see also Brosius 1998; Kawase 1984.

¹⁴ We hear, for instance, that the Greek sculptor Telephanes of Phokaea worked at the courts of Darius and Xerxes (Pliny, *Natural History* 24.68; Miller 1997, 103).

¹⁵ New evidence for the preparation of the stone surfaces at a number of façades from Persepolis has been discovered in recent years: According to Ridolfi et al. 2019, the craftsmen used “bone fragments, . . . a main ingredient for the production of fluorapatite, a substance used for whitening the grayish limestone surface of the monuments of the Persepolis Terrace.” For aspects of the relationship between sculptors and painter in the working process in the ancient Mediterranean see, e.g. Brinkmann 2003, 63; Ridgway 1983.

¹⁶ Diba 2006, 283–4 (“architect, chief designer, and court painter”); Ekhtiar 1998, 55–6; Ritter 2005, 86–7; Abdullah Han was both Naqqasbasi and Mimarbasi. Floor 1999, 2005; See also Von Gall and Luft 2020, 95.

centuries BCE. The history of the polychromatic appearances of the façades at Persepolis, Susa, and beyond is connected with the history of craftsmen and migration at large. Paint was even a tool used in construction methods, just as it was a tool used in embellishment and iconographical enhancement. Carl Nylander has argued, for example, that some of the reliefs at Persepolis were stippled with a toothed chisel for the purpose of preparing them for paint, and that finely incised lines attested on several reliefs served as guidelines for the painters. He also demonstrated convincingly that a reddish layer still observable on many surfaces on the Takht was used as a guide for joining blocks such as column drums to achieve a close fit.¹⁷ This technique of using red paint in the construction process has a direct link to Ionian stone-working tradition, as explicated by Nylander. Likewise, techniques of and approaches to *embellishment* by painting and gilding, as well as the embellishments of monuments with metal or precious stone inlays, doubtless also depended greatly upon venerable traditions of the arts of the peoples within the empire.

It has been argued that various parts of the sculpted façade of the Apadana at Persepolis were left unfinished.¹⁸ However, since in my view the entire façade was certainly painted, I would argue that “unfinished” is a misleading term here. Parts that may appear unfinished to us today, because they are not fully carved out, may simply have been painted over.

In anthropological discourse and in the arenas of classical and western Asian archaeology, the status of craftsmen has received much attention. There is now a vast bibliography on the subject.¹⁹ It remains difficult, however, to establish any evidence of status distinction between different craftsmen engaged at Persepolis. Administrative documents offer little, so far, to allow us to assess status differentials between, for example, specific *types* of painters, gilders, or ornament makers at the Persian court.²⁰

Interesting comparative information, related specifically to painters and sculptors, comes from Athens at the period contemporary with the Achaemenid Persian Empire. Of the more than 100 workers epigraphically attested to have built the Erechtheum on the Acropolis in Athens at the end of the fifth century BCE, most of whom were foreign workers (*metics*), only three are referred to as painters, and only one is explicitly called a gilder.²¹ The

¹⁷ Nylander 1965, 1970, 28, 37–8; see also Homayoun et al. 2021.

¹⁸ Sweek and Simpson 2009.

¹⁹ Greece and Rome: e.g. Burford 1972; Cuomo 2007; Fischer-Hansen 2000; Gummerus 1913; Harris 2001; Meissner 1999; Pipili 2000; Randall 1953. western Asia: e.g. papers in Gunter 1990.

²⁰ Tamerus 2018 summarized what we know about the laborers from the epigraphic evidence to improve our understanding of the underlying economic systems.

²¹ IG I³ 467 ll. 54–9; 291–5; 351–4; Paton et al. 1927, 409; Randall 1953, 201; Schultz 2009, 77–8 n. 29–33.

inscriptions also reveal that, compared to the wages of sculptors, the compensation the painters and gilders received was low.²² Although the records are very specific, they are not complete. For example, we do not know who was responsible for inlaying the multicolored glass beads that were part of the architectural decoration.²³ The information provided on the payments to workers is, however, in sharp contrast to the payment documented for an early third-century BCE painter at Delos, who received the same compensation as the sculptor.²⁴

While we have such records for Athens and Delos, to date, the Persepolis Fortification and Treasury tablets do not indicate unequal compensation for these different jobs. Workshops of the craftsmen employed at Persepolis may have existed immediately to the north and west of the terrace. Lack of sufficient documentation from early excavations prevents us from drawing definitive conclusions at this time though the recent work at Persepolis West in particular provided new evidence for local manufacturing and crafting.²⁵ That work and life probably intermingled in the area close to the Takht is clear, nevertheless, from parallels from other ancient Egyptian and western Asian sites.²⁶

ON FIND CONTEXTS AND SYMBOLIC MEANINGS

Evidence available from other ancient western Asian sites provides additional glimpses into the work processes involving color and polychromy. Large lumps of pigment were excavated by Place in the corners of a chamber in the Assyrian

²² The sculptor would make 60 drachma per figure, the painters would get only 4 to 5 drachma per foot or coffer lid (Randall 1953, 208). There is abundant evidence for polychromy and original metal attachments on the Acropolis in Athens: with the identification of (Egyptian) blue pigments and hematite on the Parthenon, it is clear that similar techniques will have been used throughout vast areas (Verri et al. 2009; Vlassopoulou 2008). In 1989, a commission published the results of XRF and electron MS on geisa, metopes, and triglyphs attesting the presence of Egyptian blue (CaCuSiO) and iron ochre (FeO) (Kouzei 1989). Obviously, the pediment sculptures themselves were painted (Jenkins and Middleton 1988).

²³ Jenkins 2006, 129, figure 117; Stern 1985. ²⁴ Collignon 1898, 57–8.

²⁵ An unpublished letter in the archives of the Institute for the Study of Ancient Cultures (April 26, 1934), sent by Herzfeld from Tehran to James Breasted refers to a recent excavation north of the terrace in what may have been such a workshop. “Grabung nördlich der Terrasse, am Fels: 3 Schichten übereinander, die zwei oberen nachachämenidisch. Darunter liegt eine achämenidische Schicht, die kleine Häuser zu enthalten scheint, wie Häuser einer kleinen Stadt. Aber vielleicht sind es Häuser und Werkstätten für Arbeiter, die Persepolis bauten. Das bisher am vollständigsten untersuchte Haus scheint eine Werkstätte eines Goldschmiedes zu sein: seltsame technische Einrichtungen, mit Ofen und da fanden wir sehr hübsche Stücke von Goldschmuck, auch viel Sachen aus Halbedelsteinen . . .” A metal slag fragment found by Herzfeld during his earlier investigations north of the platform is today in Berlin (Islamisches Museum). The recent Italian excavations west of Persepolis uncovered further evidence for workshops in the area around the platform: Amadori et al. 2021; Askari Chaverdi and Callieri 2012; 2017a.

²⁶ Drenkhahn 1995, esp. 341–2 for Egypt; Lodging 1974; Luciani 2006.

palace at Khorsabad. A red lump *en quantité considérable* weighed about 20 kg, and a blue lump about 1 kg.²⁷ In the same chamber, Place noted three unfinished sculpted stone slabs with chips of the same stone and pigment lumps scattered on the floor.²⁸ This evidence suggests that this was a workshop in which both painters and sculptors labored closely together. In room SW 6 of Fort Shalmaneser at Nimrud, the excavators discovered “large lumps of bright Egyptian Blue . . . certainly stored.”²⁹ Excavations at a Hellenistic/Roman temple in Petra in Jordan identified a subterranean painter’s workshop inside the temple.³⁰ In this workshop, pigment bowls were excavated and the materials have been analyzed.³¹ This workshop was part of the original building plan at Petra, and it is assumed that it “was meant to be for activities related to the maintenance of the building.”³² Abundant evidence for a factory and paint shops from ancient Egypt is available from Tel Amarna of the New Kingdom.³³ These assemblages include tools such as paint boxes.³⁴ There have also been important investigations on the complexities of the technical process involved in creation of painted Egyptian tombs.³⁵

Ongoing painters’ activities are revealed by the many bowls containing pigments, as well as the pellets and lumps of pigments in Persepolis, some found in secure contexts close to the monuments. We may infer that touch-up work was a constant reality of the maintenance of polychrome reliefs and other architectural elements on the site. As a consequence, the palettes, pots, and bowls and lumps of pigments can be dated from the construction period to the mid-fourth century BCE.

Archaeological evidence for paint pots and paint containers also reveals important symbolic associations.³⁶ It is striking that in some cases, the paint equipment known to us from Greek and Roman spheres comes often, but not

²⁷ Place 1867–70, vol. 2: 251.

²⁸ Place 1867–70, vol. I: 92–3; vol. III: plate 48; see also Caubet and Bouquillon 2007, 90–1 nos. 24–5. Equally large lumps were excavated at Assur (Berlin, VA Ass 04820).

²⁹ Mallowan 1966, 408. ³⁰ Hammond 1996, 49–50; Shaer 2003, 125–6.

³¹ Shaer 2003, 127–8.

³² Shaer 2003, 126. The same may have been the case on the Athenian Acropolis. “Closed jars containing actual pigments” were said to have been discovered near the southeast angle of the Parthenon during excavations in 1836 (Donaldson 1851, 44; Semper 1851b, 43). The actual excavation record (Wordsworth 1837, 281) casts doubt on this later commentary, however, since it mentions only a fragment of a vase with an inscription on it. For the materials, tools, and circumstances surrounding the activities in the painter’s workshop at Olympia see Heilmeyer 1981.

³³ Spurrell 1895, 230–5.

³⁴ Such finds are especially valuable because many of the paint containers from Egypt lack specific archaeological context. A wooden paint box from Egypt, purchased by the Oriental Institute in 1928, has been dated to the Late Period – to sometime between 1070 to 332 BCE: Chicago, Institute for the Study of Ancient Cultures Museum A13704.

³⁵ E.g. Bryan 2001, 2010, 2018; Miller 2008a; Owen and Kemp 1994.

³⁶ Nagel 2018a; Now Cavassa 2018; Devetzi 2010; Kostomitsopoulou Marketou 2019.

exclusively, from the tombs of the painters themselves.³⁷ In most of these cases, the paint containers still held pigments. This suggests that such materials were considered as appropriate offerings to the deceased. In the tomb of Tutankhamen a miniature ivory paint box made for “Princess Merytaten, Daughter of the Great Royal Nefertiti” (c. 1350 BCE) was found directly between the front paws of a statue of the god Anubis.³⁸ The evidence demonstrates that such implements of the painterly crafts were recreated as elite accoutrements with possible religious meanings. At the same time, it seems that members of the elite often positioned themselves as painters. An example of such a figure is Amenemope, who served as vizier under Amenhotep II.³⁹ In the New Kingdom, members of the royal family were known to have painted.⁴⁰

Additional material evidence from elite contexts in the western reaches of the empire suggests the validity of this concept of prestige attached to the intrinsic value of pigment-as-pigment. In the tomb of the Carian satrap Mausolus – the Mausoleum of Halicarnassus – a shell containing a large amount of blue pigment was found, although the exact circumstances of the find were not reported in the nineteenth-century record.⁴¹ Pigment cakes have been found in other tombs (unfortunately of uncertain date) in the same region.⁴² Earlier Urartian contexts have been published recently.⁴³

It is now time to return to the evidence associated directly with the building referred to as the Apadana at Persepolis. As previously noted, potsherds with pigments, as well as pigment lumps, were excavated by Tilia in front of the northern staircase, inner western flight (red, blue, and green). Very recently, more potsherds with red and blue pigments were recovered in front of the Apadana’s eastern staircase, northern flight. On each side, the material was recovered at a depth of approximately 26 cm below the base of the visible façade. The position of both these buried materials stretched out along the files of gift-bearing delegations from the subject lands depicted praise-offerings being brought toward the central panels of the two façades. Originally the central panels depicted the king about to receive these offerings.⁴⁴ I put

³⁷ E.g. Bachmann and Csyżsk 1977; Blümner 1912 vol. 4: 457.

³⁸ Berman and Bohac 1999, 312.

³⁹ Berman and Bohac 1999, 311 no. 249 and color plate 57 with the inscription “the overseer of the city and vizier [Amenemope].” A second example belonging to the same person is in the Metropolitan Museum of Art. Berman argues that the palette was used by Amenemope “for his own pleasure” (311).

⁴⁰ Berman and Bohac 1999, 312; Silverman 1982, 287–8 cat. no. 398.

⁴¹ Jenkins et al. 1997, 36 figure 5.

⁴² Jenkins et al. 1997, 36 and color plate 3, from a tomb at Kamirus, Rhodes.

⁴³ Ingo et al. 2013.

⁴⁴ These were the central panels that were removed to courtyard 17 of the Treasury, perhaps under Artaxerxes III. We do not know, however, at which point of the building’s history the pigments were deposited: Nagel 2018a.

forward the hypothesis that these paint materials were deposited by the artisans themselves, intended as buried offerings to the Apadana and to the king. Further investigation is clearly needed, but the specific find context raises provocative questions. The argument finds parallels in recent contexts discovered elsewhere. On the Parthenon on the Acropolis in Athens, archaeologists detected lumps of pigment and an inscribed metal bowl within the architecture with traces of pigment and paint.⁴⁵

ON MAKING DECISIONS IN PERSEPOLIS

At the top of the hierarchy of effort leading to the polychrome environment of Persepolis, we can, with Root (1979), consider it a given that the king himself was engaged in the creation of a visual imperial message. Members of the royal family and the nobility acted as advisors to the king. For the early years of the Achaemenid Empire under Darius I, names of such individuals are preserved in Persepolis. From the Fortification tablets we learn that Parnakka, son of Aršam, who was perhaps an uncle of Darius I, oversaw the administration of Persepolis and its hinterland and was permanently based there. As the chief administrator of the royal capital, Parnakka had access to the king, no doubt recording his orders before having them carried out.⁴⁶

Below Parnakka were other administrators such as Ziššawiš, who figures prominently in the Fortification archive as Parnakka's chief assistant, carrying out similar tasks, including issuing and recording.⁴⁷ The office of *unsak* (probably meaning second-in-command) has its own official seal used on the tablets by successive holders, Karkiš and Šuddayauda, who were specifically concerned with disbursements to workers (*kurtas*).⁴⁸ In the context of a larger imperial setting, the figure of Udjahorresnet exemplifies a type of individual who was well-positioned to advise the Achaemenid court on *regional* traditions and cultural perspectives. Udjahorresnet was an Egyptian official, a former member of the Saite court, who went on to serve as an adviser on matters

⁴⁵ Vlassopoulou 2017. I owe this reference to Antigoni Zournatzi and a presentation by the excavators at a conference in Boston in 2018.

⁴⁶ Brosius 2007, 29 n. 24; Henkelman 2008, 4 n. 10. A total of 398 texts have been tabulated to refer to Parnakka, next only to Darius himself with 524 texts. For the seals of Parnakka: Garrison 1991, 9–10, figures 9–12; Garrison and Root 2001, PFS 9* and PFS 16*. For earlier work on the Achaemenid court and titular cp. Hinz 1971. On the Elamite terms *damanna* and *saramanna* for supervising officials, now Tamerus 2018, 469.

⁴⁷ Ziššawiš is probably identical with Tithaios, referred to in Hdt. 7.88 (Godley 1975). His seal is PFS 11* (a royal name seal of Darius I) depicting the king before an altar: Garrison 2000, 141 and figure 18; Garrison and Root 2001, 18–9; Kuhrt 2007, figure 11.44.

⁴⁸ This seal (PFS 1*) is used more times than any other in the Fortification archive: Garrison and Root 2001, Cat. No. 182. PFS 1* and the issue of the titulary of *unsak* are discussed in Garrison 2000, 127–30 and figure 2.

Egyptian first for Cambyses and later for Darius I in Egypt.⁴⁹ Through the mediation of high-level courtiers such as these, the mandates of the king were translated into effective artistic achievement by multiethnic groups of artisans in Persepolis and other imperial capitals.

Going a step further, can we refer to the rulers who were responsible for the final decisions?⁵⁰ How much say did they indeed have? How were choices of color determined in this environment? Were they as carefully calibrated as (in Root's view) were choices of sculpted iconographical content? For the sake of argument, one might suppose that determinations of color may have been made based simply on the availability of certain pigments or other raw materials at the necessary moment. But even such a possibly simple effort as the application of blue to the inscriptions at Naqsh-e Rostam or to the surface of a monumental bull implies decision making.⁵¹ Increasingly the evidence suggests programmatic consistencies in uses of color schemes – consistencies that imply planning with high intentionality of message. It appears that the standards of applying certain colors and color schemes, even gilding, on the surface of monuments in the empire were dictated by the nature and importance of the monuments and the wealth of the Achaemenid rulers, and by those who commissioned or supervised the work.

Much research has been done on systems of patronage in art across a range of cultures and historical settings, the involvement of rulers and government in commenting on issues of paint and polychromy, and in the supply of materials as features of centralized structures of economy and control. The guidelines on revolutionary murals of the Artistic and Cultural Bureau of the Qom Seminary's Office of Propaganda during the Iran-Iraq War 1980 to 1989 are particularly interesting: "The ultimate objective should be brevity of message, deliberate and *empathic brush strokes*, clear cut shapes and *brilliant colors*. Every mural should be framed by *solid colors*, selected from one of the *dominant colors* of the picture" [emphasis mine].⁵²

Well-documented examples of state engagement in artistic production include the involvement of Assyrian rulers, Renaissance dukes, and the Spanish king in the sixteenth century.⁵³ After Charles Texier visited the palace of the Persian Shah at Isfahan in the mid-nineteenth century, he stated that

⁴⁹ Bareš and Smoláriková 1999; Briant 2002; Lloyd 1982; Root 1979, 22; Now: Wasmuth and Creasman 2020.

⁵⁰ See, for a similar approach: Fant 1988.

⁵¹ For psychological studies related to the subject of decision making in color applications see, e.g. de Destefani and Whitfield 2008.

⁵² Trans. Chelkowski and Dabashi 1999, 291.

⁵³ For fifteenth-century Florence, scholars have detected a networking system between commissioners and executing painters (McGrath 2000); Bruquetas Galán (2008) has shown that the Spanish king Philip II (1527–98) was directly responsible for the acquisition of pigments.

all paintings in the palace . . . were made according to a uniform program. It seems that each of the paintings had to conform to the requirements of some official patron. One painting would serve as a model for all subjects of its type, which were then reproduced in both miniature and large scale historical paintings. . . . The other paintings were reproduced almost without variation for different palaces in Isfahan, and they were without doubt different copies of the original paintings, the copies often indistinguishable from their primary models.⁵⁴

In these cases, painting and polychromies were utilized throughout to convey the power of members of the elite in the public sphere. The Achaemenid king's use of art as a means of centralizing power and consolidating diplomatic relations with far-flung regions within the empire and zones on its peripheries may also have placed painting and polychromy at the center of the court's visual vocabulary. The evidence assembled here is moving in that direction.

ON PIGMENT AND EMPIRE: SUPPLYING THE COURTS WITH MATERIAL

The stone material for the palaces of Persepolis was supplied locally. At Persepolis, several of the quarries have long been known to be located close to the Takht, others further away.⁵⁵ The stone monuments recovered at Susa (discounting the statue of Darius – discussed later) were made of local Susiana limestone.⁵⁶ It is interesting that Darius specifically boasts in the so-called Susa Foundation Charters of Darius (DSf 12, 39–42), that the stone for the soaring columns of the Susa palaces came from a village by the name Hapiratush in Elam.⁵⁷ It has also been determined through scientific analysis that the raw materials for the bricks employed at Susa stemmed from the rich geological sources available locally.⁵⁸ Even without the benefit of similar materials sourcing for Persepolis, Schmidt had stipulated earlier that the glazed bricks at Persepolis must have been produced “in the neighborhood of the site.”⁵⁹ He then explains that despite his view that the Persepolis bricks were *produced*

⁵⁴ Trans. Ekhtiar 1998, 52. ⁵⁵ Emami 2010; Krefter 1967, 1971; Tilia 1968; Zare 2004.

⁵⁶ Razmjou 2002b, 102; Trichet and Vallat 1990, 205.

⁵⁷ Kent 1953, 142–4; Vallat 2013, 283–4. Root 2010 discusses the political valences of this and other attributions of labor and material in DSf, including comments on Elam, Babylonia, and Media.

⁵⁸ Ruben 1979; Trichet and Ruben 1980.

⁵⁹ Schmidt 1957, 93. Taking the DSf text at face value as fact in its statement that the makers of the bricks were Babylonians (Schmidt 1957, 93). See Root 1979, 7–8 and Root 2010, 178 on dangers of reading the DSf and companion texts as fact on a literal level. Indeed, here, Schmidt used a rhetorically charged imperial text to determine as fact the trajectory of an archaeological inquiry.

locally, “we are quite certain that the makers of these bricks were foreigners, presumably Babylonians, here as at Susa.”⁶⁰

Were the pigments for embellishing the monuments of Persepolis also locally derived, or did they come from further afield? Only recently have scholars attempted to reconstruct the process of supplying paint pigments and related materials for ancient capitals.⁶¹ Matson and Schmidt⁶² suggested that in case of Egyptian blue, two scenarios can be postulated for its acquisition and use in Persepolis:

1. that the ingredients of the compound were imported and that the artisans who made the objects were foreign experts either from Egypt or Mesopotamia;
2. that lumps or powder of Egyptian blue could have been imported for use as pigments, to be mixed locally with a carrying agent – water, egg white, etc.

These scenarios are not necessarily mutually exclusive. It can be argued that in dry form, pigment cakes and cubes formed entities that could be transported long distances elsewhere and then crushed, ground, and pulverized thoroughly with mortars, mixed with binders, and converted into the coloring agents – all on the work site itself. Recent investigations confirmed the local and regional provenance of the materials.⁶³ However, in discussing the few traces of paint preserved on the architecture and sculpture at Susa, de Mecquenem argued that some raw materials including the red ochre came “sans doute” from islands of the Persian Gulf.⁶⁴

Today, such attribution is questionable, and it is only recently that some raw materials excavated at Susa have been properly analyzed, though the evidence remains difficult to interpret.⁶⁵ Raw lapis lazuli materials were excavated at Susa, though the find context indicates a much earlier date than the Achaemenid period (**Figure 5.1**). It can be assumed that in both Achaemenid and earlier periods the manufacture and distribution of raw materials and the manufacture of pigments and gilding must have played an important role in the economy and networking of entire social groups. Demand for and supply of the materials must be seen as two factors in the network system of polychromy on a site. Egyptian blues, as well as all other materials applied to the surface of the monuments in the Achaemenid courts, required an understanding of manufacture, application techniques, and techniques for fixing and preserving colors.⁶⁶

⁶⁰ Schmidt 1957, 93.

⁶¹ E.g. Becker 2021 (pigments), Gliozzo 2007 (pigments), and Wilson 2007 (metal) for Rome; DeLaine 2021 (mortars and plasters); see also Hejl 2005. The study of pigment supply has been thriving in other fields for many years, e.g. Krischel 2011; Matthew 2011.

⁶² Matson 1957; Schmidt 1957, 133 n. 4. ⁶³ Amadori et al. 2021.

⁶⁴ De Mecquenem 1947, 95. ⁶⁵ Caubet 2013; Daucé 2013; Razmjou et al. 2004.

⁶⁶ Among our earliest preserved records on how to produce red colors from yellow earth is an Assyrian cuneiform tablet of c. 1700 BCE: Leicester 1971, 8; Thompson 1936, 31–2.

Though archaeometallurgical studies focusing on pre-Islamic Iran have made much progress, our knowledge about various raw material supplies in Fars in the Achaemenid period is still rather limited. Minerals and raw materials were exploited in mines close to Persepolis in the Achaemenid period: for example, a copper and two iron mines have been investigated since 2003.⁶⁷ A copper mine has been identified in the Bavanat boundary with several tunnels up to 40 m deep, where copper sulfide and copper oxide were excavated. Faryadan and Kan Ghobar, two iron mines, are located in the same region, have deposits of magnetite and siderite. Both mines have two large gates some 14–17 m below ground, again with several tunnels, with pottery found there that suggests metallurgical processing for the Achaemenid period.⁶⁸ It is possible that the green-producing malachite used for pigment ($\text{Cu}_2[(\text{OH})_2|\text{CO}_3]$), a copper oxide identified on the monuments on the Takht and easily smelted in a crucible, originated from these mines near Persepolis.⁶⁹ Finally, azurite was available, too, in Iran (**Figure 5.2**).

Very recently, investigations on the mineralogical compositions of ochre lumps excavated in Persepolis West led scholars to consider again the local availability of mines, such as the Dehbid iron deposits northeast of Shiraz.⁷⁰

While mines for some raw materials are documented in the area around Persepolis, some materials needed for the embellishment and finishing of architectural sculpture on the monuments would have traveled from distant regions of Iran and of the empire more widely. Gold, for example, was available from numerous places in the empire. More than one hundred gold and gold-bearing deposits and occurrences have been identified in Iran. Thirteen had clearly been exploited in the pre-Islamic period, some of these located in southeast Iran.⁷¹ In addition, east of Fars, the River Hyctanis in the province of Carmania⁷² is mentioned in ancient texts as a source for gold

⁶⁷ Emami 2005. For a general overview about the history of mining in Iran, see Ghorbani 2013, esp. 65–78.

⁶⁸ Emami 2005. Recent archaeological research has confirmed that the Iranian plateau remained an important source of metals for early cultures in the neighboring regions: Helwing 2021; Pigott 1999a, 1999b, 2004. More than 400 copper deposits have been attested in Iran, and though widely distributed across time and space almost eighty of these deposits show indications of ancient mining (Bazin and Hübner 1969; Momenzadeh 2004). Today, the Sar Cheshmeh copper porphyry mine in Kerman province in southeastern Iran and the Sungun and Meiduk deposits in the same region make Iran one of the major copper producers of Asia (Aliani et al. 2009; Momenzadeh 2004).

⁶⁹ Excavations at Tappeh Ghabristan near Qazvin in northern Iran have produced evidence that from much earlier times professional metallurgists had a profound knowledge of techniques involving malachite mining: Benoit 2004, 185. Malachite was also mined together with azurite in the silver mines of Laurium near Athens: Brinkmann 2008, 211.

⁷⁰ Amadori et al. 2021, 10.

⁷¹ Momenzadeh 2002, 2004. According to field observations gold was obtained from both hard rock and alluvial, by panning: Stöllner et al. 2004; see also, for Egypt: Klemm 2013.

⁷² Old Persian: *Karmanā*, Elamite: *Kurman* = PF 1348 = Hallock 1969, 381.



5.2. Azurite on display at the Natural History Museum, Isfahan, Iran, 2016. Photo: Author

dust.⁷³ There were also mines of silver, copper, and ochre in Armenia. Strabo refers to a gold mine and other mines, particularly one in northern Armenia, that produced *sandyx*, “which they call Armenian color.”⁷⁴

As important as is the further development of actual data on the sources of the raw materials for Achaemenid polychromy in Fars and Khuzestan, perhaps even more important is the rhetorical dimension of the supply system. The very *concept* of raw materials and labor for palatial constructions coming from all over the empire to the centers of power was also a significant rhetorical motif in the formative years of Darius I. Raw materials as prestige commodities of empire under the King’s control was a key element of the royal expression of power. The Susa Foundation Charters make this clear even though they do not explicitly refer to pigments.⁷⁵

⁷³ Pliny, *Natural History* 4. 98. According to the Persepolis Fortification tablets, the name of one of the first governors of Carmania was Karkiš, and it is known that there was a royal road through Carmania.

⁷⁴ Strabo, *Geographica*, 11.14.9; Descat 1989; Kuhrt 2007, 706.

⁷⁵ DSf, DSz, DSaa; e.g. Kent 1953, 142–4; Kuhrt 2007, 492–5 no. 13; Root 2010. Here, we can follow Khazeni’s model, as he described the economy and circulation of turquoise in Indo-Persian cultural encounters using the phrase “turquoise empires.” (Khazeni 2014).

ON KEEPING POLYCHROMY IN PLACE

This is the place to unpack our understanding of binding media in the process. Much work has been done on understanding the ancients' use of various materials for binding, which could include beeswax, plant gum, and other materials.⁷⁶

On the Takht of Persepolis and on the façades of the tombs of the Achaemenid rulers, architectural elements and sculptures were repaired and certainly cleaned during the Achaemenid period. The many restorations that can be attributed to this period have been documented in exemplary publications of the Italian restoration team between 1965 and 1978.⁷⁷ In fact, there is not a single structure on the Takht in which repairs have not been identified. Achaemenid efforts to restore and preserve relief sculptures have also been identified on the façades of the reliefs at Naqsh-e Rostam.⁷⁸ On the monumental relief depicting Darius I at Bisotun archaeologists counted at least ten "repairs."⁷⁹ Evidence of ancient restorations in the palaces of Achaemenid Susa has also been documented.⁸⁰

It would be revealing to undertake linguistic studies of the Old Persian, Elamite, and Babylonian words preserved in inscriptions and translated as "restored." When, for instance, Artaxerxes II (404–358 BCE) claims to have "restored" the palace of his grandfather at Susa, what did he mean?⁸¹ Is this yet another rhetorical motif meant to express a metaphorical concept of kingship? Or does it refer explicitly to actual physical restorations of a structure? As old or broken pieces of stone were replaced by new ones, paintings may have vanished once the colors became dull. They may have been overpainted. Thus far investigations have not revealed any overpainting on relief sculptures. This, of course, does not mean that there was no such overpainting.

ON POLYCHROMIES IN EMPIRE: COLOR AS A SIGNIFIER OF WEALTH

Achaemenid Persia offers an excellent case study for the multitude of issues related to the interrelation between color and power. The remains of

⁷⁶ Aggelakopoulou and Bakolas 2022 (beeswax as binder on the Parthenon in Athens); Amadori et al. 2021, 11, report on a lipid compound found on lumps excavated at Persepolis West; Fulcher et al. 2022; Newman and Halpine 2001.

⁷⁷ Tilia 1968, 1969a, 1969b, 1972, 1974, 1977, 1978. ⁷⁸ Nagel and Rahsaz 2010.

⁷⁹ Luschey 1968, 83. ⁸⁰ Boucharlat 2013, 393.

⁸¹ Darius I restored certain structures at Susa (DSe § 5 – Kent 1953, 141–42). In this aspect it is interesting to note that according to Potts (1999, 325), "Darius never speaks of restoring buildings, . . . a clear break from his Elamite predecessors." See now Root 2010, 186, making explicit that it refers to the restoring of the order in an empire and a rebuilding of a wall: cp. the trans. by Kuhrt (2007, 491): "There was a much earlier building which was not in a good state; at Susa I saw that the fortress had collapsed. Then I built another fortress there." On temple "restorations" in ancient western Asia see now: Schaudig 2010. The term used in ancient Greek was *kosmesis* and is attested for the monuments on the island of Delos: Brinkmann 2003, 24.

Persepolis and Susa allow us to employ theories about technological knowledge, levels of communication, and issues of imperial message embedded in the programmatics of polychromy. Specific minerals employed to enhance the surface of monuments and artifacts may have signaled important messages.

Plutarch, describing the Macedonian campaigns against the Achaemenid Empire, stated that Alexander discovered at Susa some 5,000 talents of *porphyra hermionike*, “purple from Hermione,” which had been stored for 190 years and “was still fresh in color.”⁸² This suggests that a trove of molluscan pigment for purple color was kept as an intrinsically as well as symbolically valuable prestige commodity held in a royal treasury context, and it may provide an analogy for what we see on the Takht at Persepolis, with its remnants of a diverse range of materials.⁸³

The purple purportedly hoarded in the royal treasury at Susa may have been used for dyeing textiles of the elite. It seems increasingly likely that by the Achaemenid period purple had become something of a royal prerogative.⁸⁴ Gage acknowledges the discovery of remnants of purple cloth with gold medallions from the Tomb of Philip II in Vergina, Greece (ancient Macedonia). The Macedonian court of Philip II (contemporaneous with the late Achaemenid empire) arguably reflects cultural norms of the Achaemenid kings, whose courtly arts were certainly emulated in other features of the Macedonian record. An alabaster vessel, introduced in the section “On Color, Materiality, and Surface in Persepolis,” is an item of great interest in relation to the connection between purple and royal power in the Achaemenid Empire.

In a compelling article, Aufrère has convincingly set an analogy between ancient Egyptian temples and treasure mines of minerals.⁸⁵ From the observations on Achaemenid palace architectural decoration offered in previous chapters this might be a useful way to consider the meaning of the polychrome appearance of Achaemenid palaces as well. One can argue that color served as an indication of wealth.⁸⁶

ON WHITE ON BLUE – GOLD ON BLUE: THE “BEAUTIFUL ILLUSION”

Research on linguistic aspects of color in the written sources available for ancient western Asia is thriving.⁸⁷ However, there are many gaps in our

⁸² Plutarch, *Alexander* 36.36.

⁸³ Cahill 1985; Schmidt 1957. See Gage 1993, 25–6, 80 on high-quality purple as a very expensive commodity (see also, e.g. Blum 1998; Cooksey 1994; Hermann 1975; Reinhold 1970; Stutz 1990).

⁸⁴ Gage has argued that purple did not become a royal prerogative until the Roman Empire: Gage 1993, 25; Pliny, *Natural History* IX, 36.126.

⁸⁵ Aufrère 2001. ⁸⁶ Summitt 2000, 146–9.

⁸⁷ Benvenuto 2019; Brenner 1999; García Ureña et al. 2022; Rossi 1996, 2006, 2021; Thavapalan 2019a. Rossi reviewed the linguistic aspects of color terms relevant in Indo-Iranian Studies. He has investigated aspects of color terms referred to in the *Avesta*, updating

knowledge that linguistic approaches cannot fill. Color naming, color perception, and color meaning are different concepts, as the responses to the influential study of Berlin and Kay (1969) on the seven-stage evolutionary sequence of color terms has proven.⁸⁸ The widely accepted theory that color designations in earlier times were not as exact as in our own day is true for ancient languages spoken and written about in ancient Iran as well as for others. Thus, for instance, “the area of blue-green was often indeterminate, simply suggesting something dark, whereas the red-yellow hues often formed a single, light category.”⁸⁹ This book is *not* a systematic inquiry into linguistic aspects of color and, therefore, it does not focus on the terms that may have been used for the applied pigments for the polychromy of Achaemenid Persian architectural sculpture in palaces, as attested in the many languages written and spoken in Persepolis and throughout the empire. Here, only selected issues relating specifically to language and color in Persepolis are discussed.

Blue occupies an important place not only in the material records preserved from Persepolis, Naqsh-e Rostam, and Susa, but also in modern discussions of the meaning of color in ancient western Asia and in the Achaemenid Empire more widely.

Names for colors are known in Elamite, Old Persian, and Aramaic.⁹⁰ However, we need to be cautious in their interpretation. For instance, while Kent has translated the term *aranjanam* as “ornamentation” or “decoration,”⁹¹ Tavernier has proposed that it refers to “colour, painting materials,”⁹² while Vallat translates the contexts as “the decorative elements with which the terrace was painted.”⁹³ Two terms for blue are particularly relevant here: the term *kapautaka* (k-p-u-t-k-) is identified as blue,⁹⁴ based on Cameron’s reading (1948, 42), as has the term *kāsakana-* (k-a-s-k-i-n) been identified as green/blue, lapis-lazuli colored. But what did *kapautaka* and *kāsakana* really signify? A discourse on issues related to the meaning of “blue” in Achaemenid Persia can be a case-in-point.

The confusion of modern scholars who “translate” ancient Persian attitudes toward names for colors, minerals, and actual appearance and compare them with modern concepts of color causes difficulty. A startling yet intriguing case of the scholarly confusion is that of doorknobs/wall pegs excavated on the

an earlier work on colors in the *Avesta* (Jackson 1890; Rossi 1996, 2006). For many years Rossi lamented the absence of studies related to color aspects and called for a multidisciplinary research project on ancient Iranian color terminology. The recent work by Benvenuto is especially significant as it addresses important color terms in Aramaic used in Achaemenid Bactria.

⁸⁸ Borg 1999.

⁸⁹ Schimmel and Soucek 1992, 46; cp. Rossi 2006, 461. The study of color terminology in Akkadian and Sumerian by Landsberger remains crucial: Landsberger 1967.

⁹⁰ Tavernier 2007, 36, 80, 441–2. See also, Benvenuto 2019; Schmitt 1996.

⁹¹ Kent 1953, 170. ⁹² Tavernier 2007, 36. ⁹³ Vallat 2013, 284, 286.

⁹⁴ Tavernier 2007, 36.



5.3. Fragment of doorknob or wall peg with trilingual inscriptions (DPi), excavated near the so-called Harem. Tehran Museum, Inv. No. 2405. Photo: National Museum of Iran, Tehran

Persepolis Takht (**Figures 5.3** and **5.4**). Highlighted in a white paste, the cuneiform inscriptions DPi and XPi on these knobs include the term *kāsa-kaina*.⁹⁵ This term has troubled philologists from the beginning. Various translations have been suggested. In his early authoritative edition of the Old Persian, Kent translated it simply as “door knob of precious stone, made in the house of Darius the King” (1953, 137), while the authors of the 2005 British Museum exhibition catalog, *Forgotten Empire*, translate “peg of lapis lazuli made in the house of Darius the King.”⁹⁶ Schmitt, arguably the most authoritative scholar of Old Persian texts in our day, has translated it as “knob of precious stone (imitation), produced at the court of King Darius.”⁹⁷ In fact, the materiality of many of these items would need to be investigated further. Some claim they were made of Egyptian blue, yet a recent investigation in the National Museum in Tehran proved that we need to be more careful in our terminologies.⁹⁸ We seem to be faced with the combined problems of (1) the vagaries of translating

⁹⁵ Herzfeld 1938, 23; Kent 1953, 109; Now Basello 2012.

⁹⁶ Curtis and Razmjou 2005, 96, no. 83. Cp. Amiet 2013, 336: “pommel in lapis lazuli made in the house of Darius, the king.”

⁹⁷ Schmitt 2009, 120: “Knauf aus Halbedelstein(imitat), an des Königs Dareios Hof hergestellt” (trans. mine).

⁹⁸ Basello 2012; Curtis and Razmjou 2005, 96; Dadashzadeh et al. 2017.



5.4. Fragment of doorknob or wall peg with trilingual inscriptions (DPi), excavated near the so-called Harem. Tehran Museum, Inv. No. 2408. Photo: National Museum of Iran, Tehran

ancient texts, in original languages some of which, like Old Persian and Elamite, do not have deep attested lexicons for terms of this sort; (2) the probability of embedded ambiguities and fluidities of the ancient languages themselves; and (3) the possibility that some scribes, especially those operating in a polyglot environment such as existed in Persepolis and Susa, were sometimes out of their depth in rendering certain nuances. The doorknob artifacts as features of Achaemenid palatial furnishing operate, therefore, on several levels of evidence. At the most basic level, they exemplify another way in which polychromy existed in the Persepolis palatial environment, in this case, a blue-colored object projected out from doors or walls in a dynamic three-dimensional form. Beyond that level, the doorknobs' blue color certainly evoked the visual/material idea of lapis. Although not literally made of lapis lazuli, their blue color and particular hue strongly resemble lapis. They were, therefore, evocative of lapis as the opulent commodity it was. The fact that they are inscribed with the royal name adds an extra symbolic aura to them as colored entities punctuating the architecture. The inscriptions on the knobs bring us face to face with the ambiguities of "blue" as a language term in the culture.⁹⁹

⁹⁹ It is recognized ethnographically that the absence of a specific dedicated term for "blue" in many cultures does not mean that there was an absence of the presence of the color blue.



5.5. Egyptian blue lion paw, inlaid claws missing, excavated at Persepolis. Institute for the Study of Ancient Cultures Museum, Chicago, A23054. Photo: Institute for the Study of Ancient Cultures Chicago

Blue materials were found throughout the empire. Two pearls of blue color were excavated with the remains of Saltman 4 dating from the Achaemenid period (405–380 BCE) in the mines of Douzlakh.¹⁰⁰ Fragments of miniature lions and other materials made entirely out of lapis have been excavated in Persepolis and are known from the modern art market (**Figures 5.5–5.8**).¹⁰¹

It is also important to note that blue was used as a colorant to paint parts of the Persepolitan column capitals. In particular, the animal protome elements of

Akkadian renders blue by *uquṭ*, which is a term used interchangeably for lapis lazuli or turquoise: Landsberger 1967.

¹⁰⁰ Stöllner et al. 2020, 326 nos. 177–8.

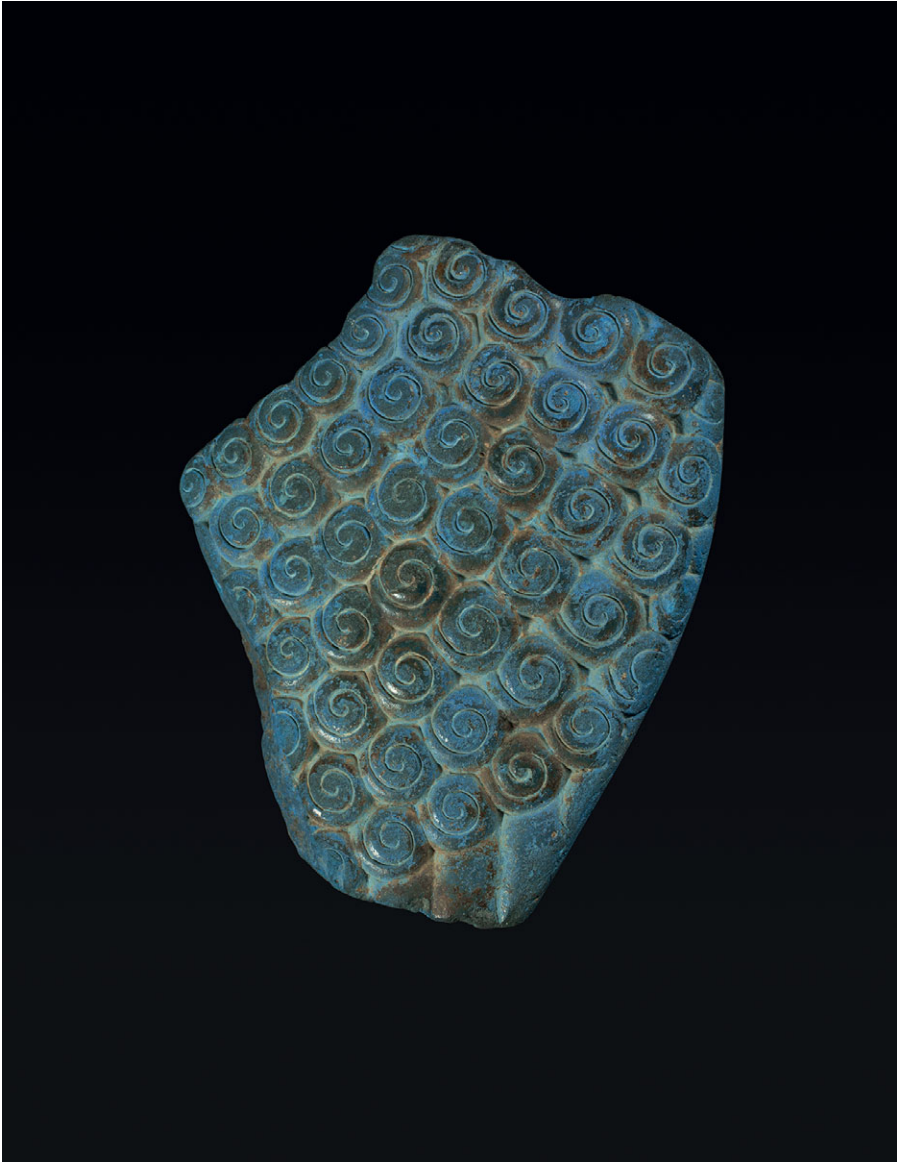
¹⁰¹ Nagel 2021b. Curtis and Razmjou 2005, 102 no. 95, excavated east of the Palace of Xerxes in 1951; further examples in the Persepolis Museum and the Institute for the Study of Ancient Cultures Museum, University of Chicago: PT 2.151, excavated by Herzfeld, body of lion of lapis. At least one other well-preserved lion of blue materials – unfortunately without a specific find context – was recovered from the art market: Hori and Ishida 1986, 13 no. 26 and color image, 15.



5.6. Lion's paw with traces of blue paint, excavated at Persepolis. Institute for the Study of Ancient Cultures Museum, Chicago, Inv. No. 24117. Photo: Institute for the Study of Ancient Cultures, Chicago



5.7. Head of blue material, excavated at Persepolis. Tehran Museum, Inv. No. 1294. Photo: National Museum of Iran, Tehran



5.8. Beard fragment of blue material, acquired by the American Edward Newell (1886–1941) from an unknown dealer, Achaemenid period. Yale Peabody Museum BC 038145. Courtesy of the Yale Peabody Museum, Babylonian Collection. Photograph by Carl Kaufman

the capitals in the form of bulls and, less frequently, lions, strongly suggest the multiple layers of meanings of blue. The lion and the bull had strong cosmic associations as wild creatures symbolizing celestial forces of sun and moon.¹⁰² The color blue, as universally recognized, is directly linked to the heavens and by extension to qualities of shining aura.¹⁰³ A closely related meaning of blue is

¹⁰² Root 2002a.

¹⁰³ Borg 1999; Hoeppe 2007; Landsberger 1967.

conveyed by the blue coloring of hair and beards of elite male figures on the Persepolis reliefs.¹⁰⁴ In this context, the surrounding of the face with blue connotes a framing of gleaming splendor.¹⁰⁵ Both of these situations in Persepolis speak to the intertwining of the color blue rendered often with paint and the semiprecious stone of great value and symbolic association, lapis lazuli. The work of Herrmann, Winter, and Moorey has shown that lapis was charged with meanings. According to Moorey, “lapis-like was a standard metaphor for unusual wealth from early in the extant literary tradition [of ancient Mesopotamia], and this stone was for long synonymous with gleaming splendor, an attribute of gods and heroes.”¹⁰⁶

The intertwining of cosmic or spiritual connotations with the colors and materials of blue is further attested through the Persepolis Fortification tablets. Here, color terms were used not only literally to describe colors; they were also used to name individuals or to define aspects of the natural landscape. In a recently published tablet presenting a religious journal, reference is made to the divine mountain *Ak-se-na-na*, which was part of the wider Persepolis region.¹⁰⁷ The Elamite term *Ak-se-na-na* (Old Persian: *axsaina*), meaning blue-green or turquoise, has also been identified as a qualifier of precious stone in inscriptions of Darius I¹⁰⁸ and, in addition, as a personal name.¹⁰⁹

Material imitations are one important aspect when studying the polychromy of Achaemenid Persian sculpture. The blues may well have been painted to create an illusion of actual lapis.¹¹⁰ Thus, if we see traces of blue on the head of

¹⁰⁴ Persepolis figures, where traces of blue have been detected on beards, include the beard of Darius at Naqsh-e Rostam and the southern tomb above the Takht (see, e.g. Tilia 1978, 43, figure 2a). For an actual finding of an inlaid beard made of blue composition, see Tilia 1978, plate C figure 2. As for the Susa glazed bricks, there are many variables how the colors appear today, including conservation treatments and wear patterns. Unlike Persepolis, Susa has no rendering of a royal figure depicted in the glazed bricks.

¹⁰⁵ Rossi 2006, 475–6. It is worthwhile looking at immediately post-Achaemenid cultures. It has been suggested that in the Sogdian paintings at Panjikent (Tadjikistan) “blue is associated with the flesh of individuals whose attributes and iconography indicate their supernatural status”: Azarpay 1981, 165.

¹⁰⁶ Herrmann 1966, 1968; Moorey 1994, 85; Winter 1999.

¹⁰⁷ Henkelman 2008, 393, 536 = PFNN 2259: 4. ¹⁰⁸ Tavernier 2007, 47.

¹⁰⁹ PF 479: 2; PFNN 522: 14, PFNN 1467: 2, PFNN 2127: 2 = Henkelman 2008, 393; There is a striking analogy in Assyrian royal texts referring to a “Lapis Lazuli Mountain,” likely referring to part of the Karkas mountains: Alibaigi and Rezaei 2018 (“Cobalt Blue”).

¹¹⁰ In summer 2022, the Rathgen Research Laboratory in Berlin was able to attest ultramarine (the pigment made from lapis lazuli) on paper squeezes from limestone fragments from Persepolis. Recently, tests have been done on the wall paintings from the Shaour palace at Susa which also provide evidence for the use of grinded lapis lazuli. The results of this analysis await definitive interpretation by F. Mohseni. According to Moorey (1994, 85), “it [lapis lazuli] was not ground up and used as a pigment in either paint or glazes in antiquity in Mesopotamia. Ultramarine . . . seems first to be documented about AD 500 in wall-paintings in Central Asia. In Mesopotamia it appears at Ctesiphon in the sixth to seventh centuries AD.”

the bull, we can interpret it as an imitation of lapis or an evocation of this precious stone. “Beautiful illusions”¹¹¹ is one way to describe a characteristic feature of polychromy of the Achaemenid environment.

ON COLOR, MATERIALITY, AND SURFACE IN PERSEPOLIS

Our discussion on the blue paints and precious colorful materials attested at Persepolis invites us to investigate further aspects of color, materiality, and surface at Persepolis. The first issue we discuss will be the materiality of the limestones used for stone architectural/sculptural elements at the site. Two limestone quarries very close to the Takht were identified many years ago as the sources for the stone elements at Persepolis.¹¹² More recently, Azam Zare, Seyed Mohammadamin Emami, and others identified additional quarries in the area supplying materials for the architecture and relief sculptures.¹¹³ A systematic documentation investigating in which specific buildings or on which elements of the buildings these materials are is at this point still a desideratum. For our purposes here, this is an issue because scholars noted variations in color from a light-colored to a dark hue of local limestones at Achaemenid sites.

For Pasargadae, Boardman and de Francovich once argued that the mix of light and dark limestone used for architectural elements of Palace R and Palace S, were employed in a systematic fashion that reflected Ionian influence.¹¹⁴ Reviewing the material evidence, Nylander concluded that (1) such systematic variation in color is attested only in selected contexts, and that (2) such accentuation by color contrasts might have been used for purely aesthetic considerations that may or may not have reflected input from a specific craft tradition.¹¹⁵ We must ask whether the bichromatism, as apparent through the various inherent limestone characteristics, where it does exist at Pasargadae, was originally meant to be seen, or whether we just miss one element in the chain: would a final coating of paint have obscured these variations in the material? As previously mentioned, the observations made by Herzfeld and Lerner revealed clear evidence of paint on the stone reliefs of the monuments at Pasargadae. So far, the evidence for polychromy on stone

¹¹¹ Kühnlethal 2004, 17. ¹¹² Tilia 1968, 76.

¹¹³ Emami 2010; Guidi et al. 2008; Zare 2004.

¹¹⁴ Boardman 1959, 217; Francovich 1966, 233–4.

¹¹⁵ Nylander 1970, 143 cites Palace P at Pasargadae, where the various stones were used in an “entirely unstructural way.” He therefore concludes: “What we find in Pasargadae is thus not a bichromatism evincing structural analysis and an accentuation of the constituting parts but a predominantly optical, atectonic play of contrasts, based, no doubt, on purely aesthetic considerations.” Tilia had argued that such would reflect a distinction between a purely decorative and structural use, in that the dark stones were used for “decorative elements” (Tilia 1968, 68), while the light-colored stones were used for all “constructive elements” (ibid.).

columns at Pasargadae is limited to remnants of painted plaster that once covered wooden columns.

Turning to Persepolis, Nylander made the important statement that such systematic bichromatism in stone deployment as *does* appear in selected places at Pasargadae is not evidenced at Persepolis at all. By contrast, we have abundant evidence for added paint. It can be argued that it is important to systematically record the locations of the various limestones used at Persepolis. The ultimate goal of such systematic documentation could of course reveal any heretofore unacknowledged use of a systematic bichromatism on the Takht. Such a finding would be an exciting new discovery about modes of polychromy here. A reversal of our current understanding that the variegated colors did not occur for some consistently applied aesthetic reason intended to highlight the natural surface appearance of the stone as material cannot be anticipated. Rather, I would argue that such systematic documentation might help us to understand other important issues involved in the material aspects of the stone. Some of these quarries may have yielded better blocks for massive scale entities, for instance, such as bull capitals. Particularly interesting is that various limestones might have had different abilities to receive and hold pigments. This, in turn, would potentially provide useful information about the processes of stone working and stone painting.¹¹⁶

Let us briefly contemplate the issue of material, surface, and polychromy in relation to two examples drawn from the portable courtly arts of the Achaemenid Persian Empire. We are accustomed to *imagine* the royal splendor of royal garments and rugs – now mostly lost to us in their materiality.¹¹⁷ Such items are all part of our understanding of polychromy in the empire. Less commonly considered, however, are the polychromatic aspects of sumptuous ivory and alabaster objects. Both of these luxury items might seem to us moderns as valuable for their inherent material characteristics. Both fine alabaster vessels from Egypt and furniture inlays of elephant ivory are prestigious features of the visual environment of the Persian court, which we, from our modern day perspective, think of as valuable for their natural appearance as well as expensive because of their exotic nature. Thinking about both of these commodities in relation to polychromy enables us to consider them in a rather different way. The very material that these objects were made of may be only one crucial element signifying their value. It is now clear that these same materials acquired added value and meaning through the overlay of other materials.

¹¹⁶ The painting process at Achaemenid Persepolis is still too little understood to allow statements on how the pigments were applied onto the surface of the monuments. See, now, however, the wonderful new results from recent Iranian-Italian fieldwork on the site: Askari Chaverdi et al. 2016; Laurenzi Tabasso and Lazzarini 2017. The issues discussed here about stone qualities will ultimately need to be coordinated with such investigations.

¹¹⁷ See, e.g. Balatti 2019; Llewelyn-Jones 2021; Vogelsang-Eastwood 2006.

Let us begin the review of evidence with an inscribed white calcite alabaster jar associated with the court of Darius I. This vessel, measuring 37 cm in height, bears the name and title of Darius I in Old Persian, Elamite, and Babylonian as well as in Egyptian hieroglyphs.¹¹⁸ Unfortunately, the vessel lacks any specific find context. The entire exterior surface of the pot was originally painted in purple. This technique of application here mimics somewhat the technique that would have been used to apply paint to stone sculpture. By the same token, the molluscan pigment used here could also have been employed for textile dyeing.¹¹⁹ These alabaster vessels may have been used as containers for documents or for cosmetics or ointments.¹²⁰ Or perhaps they were never intended to contain anything, but rather were meant to stand on their own as precious objects whose ephemeral painted surfaces would have precluded much handling on any kind of day-to-day basis.¹²¹ In the opinion of the philologist Schmitt, they were all probably carved in Egypt.¹²²

Their wide distribution throughout the Achaemenid Persian Empire in the fifth and fourth centuries BCE, combined with the funerary or temple findspots of those with known provenience, and their royal-name inscriptions, suggests that they were gifts from the Achaemenid king to particularly worthy subjects.¹²³ Work on the seals ratifying the Persepolis Fortification tablets has greatly increased our understanding of the meaning, cultural implications, and administrative roles of royally inscribed seals as tightly controlled courtly items given by the king.¹²⁴ In this respect, the inscribed alabaster jars are also similar to royally-inscribed Achaemenid phialai of precious metal.¹²⁵

¹¹⁸ Koren 2008.

¹¹⁹ Zvi Koren, June 16, 2010, pers. comm. This alabaster vessel is only one item of a significant corpus of similar alabaster vessels inscribed with the name of an Achaemenid king. Additional examples have been described by Amiet (2013, 334–7), Schmitt (2001), and Stolper (1996, 167). They include one bearing the name of Xerxes and another bearing the name of Artaxerxes, both from the Tomb of the satrap Mausolus of Caria. Other excavated examples of Darius, Xerxes, and Artaxerxes come from Susa (Curtis and Tallis 2005, 129 nos. 140–5; cp. Schmidt 1957, 86). Another example (Xerxes) stems from the temple precinct at Uruk in Mesopotamia; an Artaxerxes jar, a surface find, stems from the University of Michigan expeditions to Seleucia (Root 2016), there are inscribed vessels from Palestine (modern Israel), and from an Achaemenid period burial in Orsk, southern Russia. Additional examples derive from the market and were purchased in Baghdad, Aleppo, Egypt, and, more recently, Afghanistan (Schmitt 2001). A jar of Artaxerxes acquired in Egypt is in Berlin. Black pigments have been noticed embedded in the cuneiform inscription (Posener 1936, 74).

¹²⁰ Giron 1921, 144; Schmitt 2001, 191; Stolper and Westenholz 2002, 12–3.

¹²¹ Koren 2008, 391. ¹²² Schmitt 2001, 192. ¹²³ Schmidt 1957, 199.

¹²⁴ Garrison 1991; 2011, PFS 93*; Garrison and Root 2001, PFS 7*; Root 1979, 118–22. Garrison and Henkelman are working on a synthetic study of all royal name seals of the Achaemenid Persian Empire now documented – particularly those documented in secure provenance archival contexts.

¹²⁵ Gunter and Root 1998.

In light of all this and the report by Koren for the alabaster vessel of Darius I with its purple-painted exterior, the entire corpus of these alabaster items deserves to be examined closely for possible traces of pigment. It is probably not a coincidence that “royal” purple was the color coating of the jar currently displayed in the Bible Lands Museum in Jerusalem. It is most interesting that a fragment of an alabaster vessel stand bearing the cartouche of the Egyptian king Amasis (Ahmose II), who ruled Egypt immediately before the conquest by Cambyses in 525 BCE, was excavated in the Treasury at Persepolis.¹²⁶ Schmidt comments that “the red stain noticed on the lowest hieroglyph may be the remnants of original pigments. . . We do not know whether the other hieroglyphs had been filled with blue pigment, traces of which were found on the object.”¹²⁷ This artifact, presumably booty from the first conquest of Egypt, creates a material link between a Late Period Egyptian tradition of royally inscribed alabaster ware, apparently coated with pigment, and an Achaemenid court tradition building on that concept. On the evidence of the jar of Darius in the Bible Lands Museum, the Achaemenid vessels provide a crucial glimpse of the way the application of a *particular* color (purple) may have added special value to an item intimately connected to the persona of the king. As with the alabaster vessels excavated at Susa and Persepolis, and in many places of the empire, so were precious ivories, excavated in a cache at Susa or in the Treasury of Persepolis, found with traces of paint and gilding.¹²⁸ In the case of ivories, there is an earlier tradition, especially attested for Neo-Assyrian contexts, that these were once coated with paint and gilding and inlaid with semiprecious stones. Examples were excavated at Nimrud and other parts of western Asia.¹²⁹ According to Dominique Collon, “the rarity of the material made ivories a highly prized commodity although, paradoxically, it seems that they were often gilded so that the ivory would not have been visible; they were also coloured and some were fire-blackened, probably intentionally.”¹³⁰

¹²⁶ Chicago, Institute for the Study of Ancient Cultures Museum A 23397; Schmidt 1957, 83 = plates 47.3 and 48.5 = PT 4 1070.

¹²⁷ Schmidt 1957, 83.

¹²⁸ Amiet 1972, 168; 2013, 338–45; Schmidt 1957, 71. Furthermore, at Susa, ivory rosettes are attested, still retaining blue paint: Amiet 1972, 320.

¹²⁹ Herrmann 2017, 88, figure 101; 100, figures 132–3; 102, figures 140–1; 148, figure 235; 151, figure 239; Mallowan 1966, 528 no. 441 and 560; Reiche et al. 2013.

¹³⁰ Collon 1995, 161. On the ivories from Nimrud, see now Herrmann et al. 2009.



6.1. Modern painted column prepared for an exhibit on Persepolis in Speyer, Germany, inspired by traces of paint on original architectural stones on the site of Persepolis, 2006. Photo: Speyer Museum

CHAPTER SIX

CONCLUDING CONTEMPLATIONS

It is easy to lose sight of the bigger picture when one is focusing only on tiny residues of past polychromies on stone monuments. Throughout this book, I have tried to offer a set of methodological approaches and scenarios that I think offer fruitful avenues to think about and study the polychrome past of the Achaemenid Persian Empire and the sites of Persepolis and Susa in modern Iran in particular. In this final chapter, I would like to contextualize modern research on pigments, paint, and color in Achaemenid Persian art again, this time in the context of more recent imperial polychromies, later interpretations, ethical approaches, and in the global world of responsible stewardship.

Although I have not offered a comprehensive survey of possible ancient realities and modern approaches to understand the extent and role of polychromies in the Achaemenid Persian empire between the late sixth and late fourth centuries BCE (it would be impossible to do so in light of the destruction caused by those who hated the lavish buildings so very much), I argued that thinking about surface and polychromies indeed matters when thinking about Achaemenid culture and society. The evidence introduced here leaves no doubt that polychromies were a constituent element of the monuments at Persepolis, the tomb façades at nearby Naqsh-e Rostam, Susa, and the Achaemenid Persian Empire at large. Painting the façades and the ruler's voice in the inscriptions at Naqsh-e Rostam, Ganjnameh, and elsewhere mattered; color was an important agent in the transmission of information. In a vast

empire where multiethnicity and multilingualism were the order of the day, a visual program of imperial art that used color as a feature of meaning would have increased the ability of the king to convey imperial messages of magnificence and wonderment.¹ The blues that filled in and also framed the inscriptions of the façade of the tomb of Darius I at Naqsh-e Rostam certainly helped to make the scripts legible as magnificent writing to viewers looking at them high above their heads. On a microscopic level, the surface coatings on exterior façades like the Apadana reliefs and other monuments may have additionally protected the stone from weathering.²

Until very recently, modern scholars have not considered or paid much attention to the notion that polychromy played a truly substantial role among the crafts that generated the physical appearance of Achaemenid sculpture.³ The data and interpretation brought together, even in a preliminary survey, engage us to consider reading the Achaemenid Persian landscape (as well as modern historiographies) in exciting new ways.

The polychromies of Achaemenid Persepolis have three characteristic features. At first, there was a preference to craft different blue hues. Blues were used in the painting of the sculpted reliefs and on the background of the glazed bricks on the Apadana, they were used at the Tachara, the Hall of 100 Columns, and on the façades of the tombs of the kings. Blue hues remained a significant feature throughout Achamaenid Persian landscapes. Second, the colors employed formed clear contrasts with their environments. They were part of the mineral universe of Achaemenid Persepolis. Within the

¹ The Achaemenid Persian palatial environments were no exception to a rule cultural historian John Cage (1993, 208) had summarized in the “pleasure in bright saturated colors [which] was common to all periods and people.”

² Its once thick application may have been the reason why so many of the sculptures at Persepolis are so well preserved today. One open question remains, however: how structures like the two outdoor monumental bull sculptures would have been protected originally from bird ordure and other elements like the changing weather conditions on the terrace platform. In contemporaneous Greece the practice was well known (though not well studied), that rods on the summit of the cranium, so called *meniskoi* would have sufficed to keep birds away: Petersen 1889; Ridgway 1990, 200–1. Ridgway 1990 argues, however, that they may have also been originally meant to support stars as ornaments.

³ See, e.g., Farkas 1974, who does not mention color at all in her discussion of Achaemenid sculpture. Similarly, the potential role of polychromy as a shaper of *meaning* in the imperial environment has not been considered: Root 1979, whose project actually defined a concept of Achaemenid art as a program focused on representational iconography. The possibility of polychromy as a key element in such a program did not enter in. Root’s work was resisting a typical view of Achaemenid art as repetitive and meant to serve only as a blunt instrument of imperial propaganda. As late as 1988, Calmeyer argued, for instance, that it is repetition that defines Achaemenid iconography per se. There has been a steep learning curve on dealing with issues of programs for Achaemenid art.

Achaemenid palaces there was a system of cross-references between precious stones and paint applications. Blue-painted bull column capitals referred to precious lapis, and painted plaster applied to wooden columns may have been intended to imitate expensive stone columns. The very colors of the stone, though, were hidden and remained largely invisible. I argue that the elaborate polychromatic system was in parts employed to imitate precious stones presenting the empire at large. Third, bowl fragments with paint residues and tiny traces on the surface of the stone monuments are the last remaining evidence connecting us with the craftsmen and people. Based on cuneiform texts excavated (discussed previously) we know that workmen and -women with names of North African origin were involved in the decorative process. That this community included women is significant. The fact that women painters are depicted on wall paintings in Pompeii is evidence that this profession was not limited only to men in the ancient world.⁴ Why would it be?

SURFACE MATTERS AND THE SEARCH FOR *AUTHENTICITY*:
TOO MANY TASKS, TOO FEW, OR TOO MANY PIGMENTS?

A thorough investigation of the surface embellishments of the stone monuments on the Takht opens up many possibilities to understand ancient western Asian arts from a multitude of new perspectives. At first, we need to emphasize and continue to remind us about the important aspect of stratigraphic documentation. Pigments are part of the archaeological record, and as such, part of the formation process of a monument that needs to be documented.

There is a great potential for comparing and contrasting the polychromies of Achaemenid Persia with that of later cultures. When did the ancients stop taking care of the paintings in the façades of the tombs at Naqsh-e Rostam or the palaces at Persepolis? Were the Greek marble sculptures excavated on the terrace and below ever repainted once in Fars? For sure, polychromies played an important role in the architecture and sculpture of the Seleucid, Parthian and Sasanian empires: in the palace of Ardeshir (222–240 CE) at Qal-e Dukhtar, at Firuzabad, and in the palaces of Bishapur traces of paint have been documented. Dietrich Huff noted at Qal-e Dukhtar large sections of Egyptianizing leaf friezes with traces of red paint. Did they imitate painted leaf friezes from Persepolis?⁵ Excavations at the site of Parthian Nisa in modern Turkmenistan have yielded an abundance of evidence for the polychromy of both the architecture and sculpture.⁶ A first century CE limestone stele

⁴ Grimaldi 2021a, 20–1, figures 1–2.

⁵ Huff and Gignoux 1978, 134–5 n. 36; cp. Kröger 1982.

⁶ Appolonia et al. 2008; Lippolis 2009; Pilipko 2002.

depicting the god Nergal from Hatra, once on display in the museum of Mosul in Iraq, preserved abundant pigments.⁷ Here, it would also be important to document still surviving traces of paint on the colossal statue of Shapur near Bishapur.⁸ At Ctesiphon, archaeologists observed abundant evidence for polychromy and the process of painting.⁹ A new generation of scholars in Iran and Iraq is assuming responsibility for documenting the pigments. Assessing each site individually helps us to learn more about the paint techniques at these sites. There is great interest in disseminating that knowledge using advanced technologies to identify ancient pigments.

As early as 1818, Quatremère de Quincy argued that “people in general, . . . foreign to the essence, science and practice of art, want to be captured through the eye, and are often put off by incomplete works.”¹⁰ Reconstructions, incomplete works, have the potential to be misleading. This is true for color reconstructions, whether on a painting, paper, virtual, or in the round.¹¹ Why can we not make educated guesses about the original polychromies, why not create modern visions of what we think it would have looked like such as the recent 3-D reconstructions for an exhibition in the Historical Museum in Speyer in Germany in 2006 or the wonderful digital reconstruction by Iranian artist Simon Saeidi in 2017 (**Figures 6.1–6.3**)? These contemporary sophisticated craft productions are artworks in themselves. The artists involved developed a critical thinking about the practicalities involved in recreating the polychromies such as those who were responsible for the reconstructions at Sydenham or in the Louvre described in the first chapters of this book. In fact, polychrome reconstructions of Achaemenid Persian spaces surround us today (**Figure 6.4**).

Drawings made in the field by a past visitor to Persepolis may seem irrelevant once a traveler returns home and files them in the office. The watercolor by Herzfeld of a relief depicting the figure in the winged disk described earlier is a case in point. Moreover, interpretations have not always been consistent. Different observers have seen different colors on the very same sculpted architectural elements at different times. The disagreement about the colors

⁷ Dirven 2005, 123 figure 3; Dirven 2009; Downey 1977.

⁸ see introductory chapter, fn. 12.

⁹ Museum of Archaeology in Ann Arbor, Michigan: 2018.1.131 (TMA 1930.178). I am grateful to Sebastian Encina, Michelle Fontenot, and Terry Wilfong, who provided information and photographs of the bowl and its contents.

¹⁰ Quatremère de Quincy, A. 1818. *Lettres écrites de Londres à Rome et adressées à M. Canova sur les Marbres d'Elgin à Athènes*. Lettre 4. Paris, 87. Here quoted from Rossi Pinelli 1996, 296.

¹¹ When the Sistine chapel in Rome was reopened after restorations that had removed dirt over the decades, people were rather irritated and shocked about the bright colors. See Colalucci 2016, 83–93.



6.2. Modern painted columns and column capital prepared for an exhibit on Persepolis in Speyer, Germany, 2006. Photo: Speyer Museum

observed on the shoes of those depicted on the door jambs of the Central Building discussed in Chapter 3 proves that only a detailed examination of the extant remains themselves, including microphotography and diagnostic measurements, can stand the test of time. Interpretations have not always been straightforward. Taken as experiments rather than as definitive *evidence*, the process of restoring colors, even if only through digital means, can help us to address a number of puzzling questions. Striking a balance between the demands of conservation and the interests of the public to experience a restored whole is a great challenge.

Naturally, there are more issues that need to be taken into account. On many free-standing monuments living bio-organisms such as lichens, and bacteria will continue to cause major damage to stone surfaces. Taking care of and restoring aspects of the remaining traces of polychromies on the stones at the UNESCO world heritage sites of Persepolis and Susa is a complex task in which a number of professionals, with different educational backgrounds



6.3. Digital reconstruction of the northern facade of the building referred to as the Apadana or audience hall at Persepolis by the artist Simon Saeidi, 2017, with kind permission of Simon Saeidi. The idea of the painted blue background is supported by recent investigations on many of the limestone facades and the materials excavated nearby.



6.4. Feasting like an Achaemenid Persian king in a modern restaurant, Rio de Janeiro Municipal Theatre, Brazil. Other New World restaurants were inspired by the polychromy and art of Achaemenid Persian luxury and taste including the Café de l'Opera on Broadway in New York City around 1910. Photo: Diego Grandi/Alamy Stock Photo

and professional experience, must collaborate. Conservators, restorers, architectural historians, archaeologists, archivists, and natural scientists alike need to collaborate in such diagnostic studies.¹² Transdisciplinary collaboration in investigating pigments and coloration is challenging, to be sure, with much potential for difficulties of communication on evaluation and interpretation once data have been retrieved.¹³ Caring for the pigments in museums is also challenging. Today, departments of conservation have become increasingly important for assessing and confronting these challenges.¹⁴

Archaeologists and museum curators, their attitudes culturally determined, decide which path of interpretation they choose, by what approach the past is best envisioned. In developing strategies and introducing new ideas, they are responsible for how the past material culture is best reconstructed. Achaemenid Persian architectural sculpture is rich in vestigial traces of original polychromy. The stone reliefs from the site of Persepolis, as well as the carved façades of the tombs of the Achaemenid rulers above the Persepolis platform and at Naqsh-e Rostam, preserve traces of original polychromy to a remarkable degree. While we lack proper documentation for many decades of past research and even for the more recent treatment of the stone surface, the size of the terrace and its environments below suggests there is still a great chance that many more pigments and color schemes can be identified and properly recorded and analyzed. Once there is sensitivity and awareness of polychromy, necessary steps will be undertaken to document the remaining paints. Proper documentation and conservation will ideally go hand in hand, as difficult as the integration of scientific techniques into the archaeological interpretation sometimes is.¹⁵ Perhaps the greatest potential in the study of Achaemenid Persian polychromy is with the monumental tomb façades. Nearly inaccessible due to their position high above the ground, the carved and sculpted relief façades of the tombs of the Achaemenid rulers are ideal candidates for examining and discussing their once existent polychromy. Working toward revealing the layers of an archaeology of paint on the monuments is exciting.

Paint archaeology is a relatively new field that presents its own complexities. Continuing to document and discuss the evidence available for the polychromies of Persepolis and Susa is a first step toward appreciating aspects of material culture employed in the Achaemenid court environment. So *why* does the world need studies of the pigments of Persepolis? Because the pigments are a physical testament to ancient knowledge in art, chemistry, optics, and

¹² Zehnder et al. 2000 discusses a similar case study in Egypt.

¹³ Braenne 2009; Bregnhøj and Christensen 2009; Vandenabeele et al. 2009.

¹⁴ Keene 1996; Pye 2001, 2017. ¹⁵ Agnew and Bridgland 2006; Pollard and Bray 2007.

perception. Studied together, they provide unique insights into the world of this empire.

Restoration should be avoided until conservators fully understand the complete array of factors affecting their preservation and decay. Cleaning of ancient stone sculptures and architecture has often resulted in controversy.¹⁶ Increasing attention has to be given to research on climate control in museums, as well as assessing theories underlying and histories of archaeological conservation and stone consolidation.¹⁷

As difficult as it is, documentation with ever evolving developed equipment and facilities, sophisticated new techniques including portable equipment that can be brought to the sites, and perhaps even construction of a pigment and paint laboratory at Persepolis will enable us to appreciate the past as it really was. In addition, polychromy needs to be promoted in the academic world, too. How can we be better stewards in preserving the existing traces of polychromy? How can we educate future generations not to forget about such evidence?

The existing literature on Persepolis and Susa and their sculptures in museums deals little with the concepts behind restoration and with the techniques used in the last two hundred years. This is, again, in no way exceptional and there are multiple reasons for it.¹⁸ There is a need to write a history of the restoration of the monuments of Takht-e Jamshid. Conservation and care have always been attempted in Persepolis, in the first two hundred years even shortly after the monuments were built, and in the last two hundred years. Documenting the history of conservation is part of investigating the polychromy there – a crucial agenda for the new era.¹⁹

ARCHAEOLOGIES OF PAINT AT PERSEPOLIS AND BEYOND: IN MEMORY OF THE KINGS

Interest in the art of Persian Revival architecture, and modern architects' engagement with Achaemenid Persian architecture in particular, has been growing in recent years.²⁰ Architects of private palaces and public buildings in nineteenth-century Persia and in regions far away from the sites introduced here, have, in one way or another, found inspiration in the monuments of Susa

¹⁶ On aspects of issues of cleaning Assyrian reliefs, Thavapalan 2019b. The reliefs from the Parthenon in Athens that became part of the British Museum's collection of ancient Greece have been heavily cleaned with destruction of much of the surface in the first part of the twentieth century. The same happened on monuments in Athens itself in the Hephæstion: Jenkins 2001. The controversies around cleaning methods and techniques have been ongoing for many decades in western conservation practice: Bomford and Leonard 2004; Carras 1972.

¹⁷ Fassina 2000; Glendinning 2013; Snethlage 2008. ¹⁸ Marijnissen 1996.

¹⁹ Nagel 2020. ²⁰ Curtis 2005; Grigor 2005a, 2005b, 2009a, 2009b, 2021.

and Persepolis, even if indirectly through bookshelves filled with European imaginative reconstructions of these palaces.²¹ The nineteenth-century Afifabad or the Narenjestan Palace in Shiraz, and in the twentieth century, the Anjoman Adaran fire temple façade (1913–16), the Mausoleum of Ferdowsi in Tuš (1934), the new Parliament building (1935), the first National Bank in Tehran (1935), and educational institutions in Iran, many of the latter ones explicitly copied via architectural façades in India, are excellent examples. While many of their forms are conscious echoes of the Achaemenid past, their unpainted surfaces betray the power of western chromophobia transferred to Iran and to its own imagining of ancient heritage. Architects of fire temples for Parsi communities in cities like Navsari, Udvada, and Mumbai in India such as Dinshaw Dorabji Mistri perfected a Persepolitan monochrome style. We have come full circle here when we realize that none other than Ernst Herzfeld and André Godard were consulted in the process of creating the architecture of Ferdowsi's unpainted mausoleum façades.²² Indeed, the past became a *foreign* country. Equally, displays of Neo-Achaemenid Persian art at major world exhibitions were now a completely white production. Both the façade and the interior architecture of the Pavilion at the 1935 Brussels exhibition, crafted under the architects Edgard Frankignoul and René Burgraeve are a case in point.²³

There were, however, exceptions, even if in temporary form only. That modern Persian artists withstood to craft a monochrome past is clear on occasions. A photograph from festivities associated with the coronation of Reza Shah in 1926 Tehran demonstrates this point. Sculptures made in honor of this occasion were painted and placed in front of a triumphal gate with a painted portrait of the ruler. A 1937 visit to Tehran and Isfahan documented gates of palaces in Tehran and in Isfahan for which the artists crafted and painted Neo-Achaemenid guardians in relief or in the round in a photo album.²⁴ And even earlier, and in other media, the polychrome pasts of Persepolis and Susa were celebrated in Iran.²⁵ (**Figures 6.5–6.7.**)

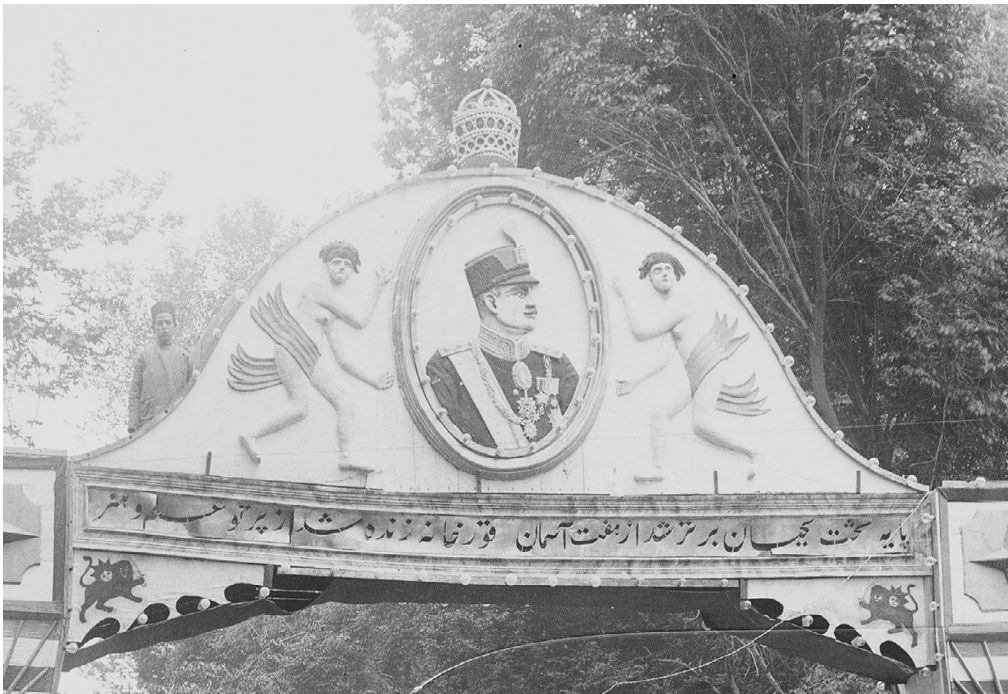
²¹ Grigor 2021.

²² Grigor 2005b, 145–6; 2009a; 2009b, 277; 2021. On the involvement of these western scholars in recreating modern Iran, see Mahdizadeh and Shojaei 2018. The paintings inside the Ferdowsi mausoleum were added at a later time. There are exceptions to this phenomenon, however. See, for example, the façade of a tomb in the Zoroastrian burial ground at Brookport Cemetery in Surrey, UK, depicting two Neo-Achaemenid guardians: Stewart 2013, 41, figure 23.

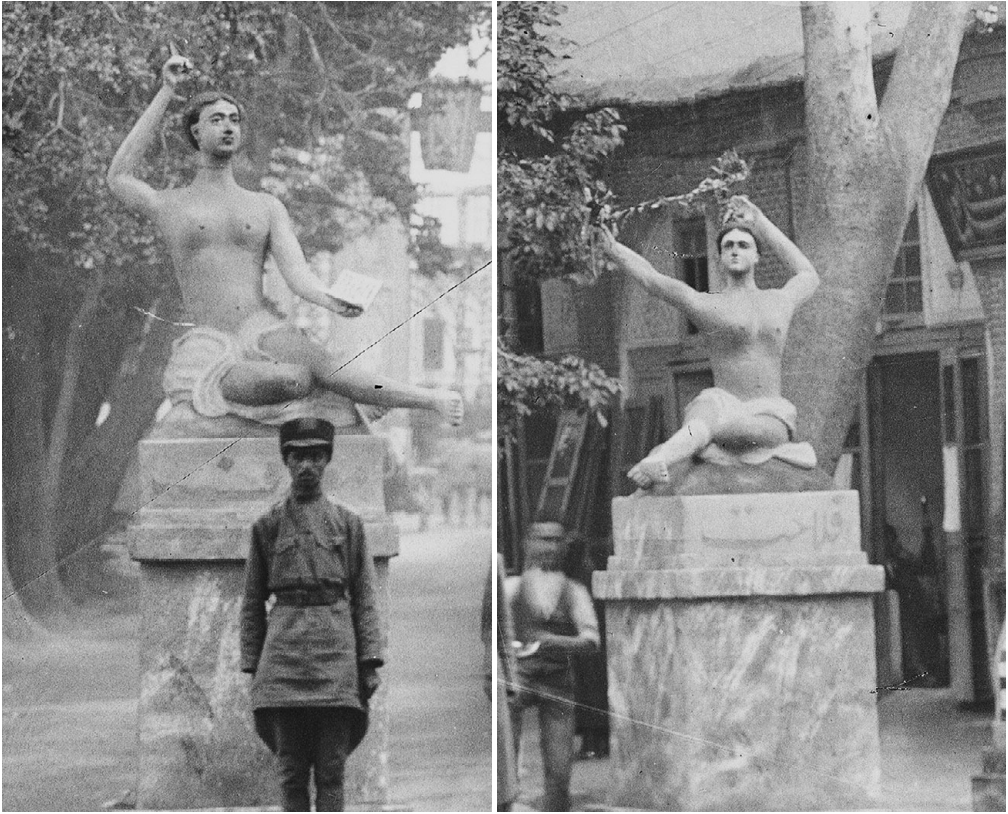
²³ Grigor 2021, 197–8.

²⁴ Evidence here comes from the photographic archives of Ernst Herzfeld in the Smithsonian Institution and photos in an album from “Record of 1937 Trip Taken by Donald Drew Egbert and Andrew Saeger Keck, Princeton, NJ,” Dumbarton Oaks, Trustees for Harvard University, Washington, DC. I am grateful for the assistance provided by Bettina Smith, Manager of the Image Collections and Fieldwork Archives at Dumbarton Oaks.

²⁵ Maktabi 2021, 146, figure 9: Qashqai “Persepolis” carpet, c. 1890–1900.



6.5. Taq-i Nusrat (Triumph Arch). Ceremonial gate with polychrome sculptures for the crowning of Reza Shah celebrations in Tehran, 1925. Smithsonian Institution, Washington, DC National Museum of Asian Art Myron Bement Smith Collection, Subseries 2.1: Islamic Archives History, Collection Information; Box 60; Folder 44: 47 P: Antoine Sevruguin, glass negatives, Iran; FSA A.4 2.12.GN.44.10. Photo. Courtesy of Smithsonian Institution, Washington, DC



6.5. (cont.)

Nineteenth-century Qajar rock reliefs were painted and taken care of: residues of paint and gilding can be seen with the bare eye on some Qajar stone reliefs. The Qajar relief on the left wall next to the Sasanian reliefs of the large grotto at Taq-e Bostan was created under the son of Fath' Ali Shah (1769–1834), Dowlat Shah (1789–1821) in 1821. Describing the depiction of Dowlat Shah, George Keppel (1799–1891), who visited the monument in 1824, noted that “the sculpture is daubed and gilded in such a manner as to eclipse . . . the performance of the ancients.”²⁶ The same monument was repainted on several occasions. There is a description by the British traveler Walter Harris (1866–1933), referring to the portrait as “gorgeously painted and gilded.”²⁷ A photograph by the German traveler

²⁶ Keppel 1827, 200–1; Von Gall and Luft 2020, 40. Naser al-Din Shah (1831–96) was less impressed with the relief monument: Von Gall and Luft 2020, 45 n. 211.

²⁷ Harris 1896; Von Gall and Luft 2020, 40 n. 199.



6.6. Ceremonial gate with polychrome interpretations of Achaemenid Persian guards, Tehran. Photo album by Donald Drew Egbert and Andrew Saeger Keck, Princeton, NJ, February–July 1937, vol. II. Photo. Courtesy of Dumbarton Oaks, Trustees for Harvard University, Washington, DC

Herrmann Burchardt (1857–1909) still shows the Qajar relief at Taq-e Bustan in almost fresh paint in vivid colors during a visit in 1905 (**Figure 6.8**).²⁸ A second example is one of the reliefs created under Fath’ Ali Shah himself at Sorsoe in Rey. This relief, painted after it was carved in c. 1831, was repainted on at least one documented occasion in 1949, though it was destroyed in the early 1970s.²⁹

²⁸ Von Gall and Luft 2020, 38, figure 23.

²⁹ Helwing and Rahemipour 2011, 17, figures 16a, 16b; Von Gall and Luft 2020, 66–71. Another relief by Shiraz was repainted in the 1970s: Von Gall and Luft 2020, 66 n. 336. However, the tombstone of Fath’ Ali Shah (c. 1834) in the Museum at Qom is completely unpainted. Qajar Art: Lerner 2017; Scarce 1992. On color in the art of tile production during the Qajar period, see Motaghedi 2019; Scarce 2009, and the recent volume edited by Fellingner et al. 2021. Recent studies suggest further that Qajar painting followed, however, along European traditions, especially toward the end of Qajar rule: Saremi Naeeni 2020, 18. Many efforts have been made now to understand better technological aspects of the art of paint during the Qajar period in Iran, imported or not: Holakooei et al. 2014.



6.7. Ceremonial gate with polychrome interpretations of Achaemenid Persian guards, Isfahan. Photo album by Donald Drew Egbert and Andrew Saeger Keck, Princeton, NJ, February–July 1937, vol. II. Photo. Courtesy of Dumbarton Oaks, Trustees for Harvard University, Washington, DC

PIGMENTS, ARCHIVES, AND MODERN POLITICS

Remarkably, the study of pigments in Persepolis also draws us into the world of modern geopolitical complexities. Early in January 2020, officials from the U.S. State Department once again issued a statement threatening to target



6.8. Painted Qajar relief at Taq-e Bostan, 1905. Photograph by the German traveler Hermann Burchardt (1857–1909), SMPK, Ethnologisches Museum Berlin, Burchardt Archiv K 569

another government and its people in western Asia. In this case it threatened the people of Iran with an imminent attack on its cultural heritage sites. An international campaign condemned this outrageous threat by the U.S. government immediately.³⁰

In the first weeks of January 2020, I repeatedly tried to contact U.S. State Department officials tasked with aspects of and in charge of cultural heritage

³⁰ “Condemn Trump’s Threat to Iran’s Cultural Heritage,” *The Guardian*, January 8, 2020. The initiative was spearheaded by Fuchsia Hart, Lindsay Allen, and Moya Carey.

protection. Worried that the government would follow through and begin an attack on the sites of Iran I had then visited so often, I feared for the life of my Iranian colleagues and friends whose daily duties were to protect their heritage in peaceful times, and who helped me so much as I was doing my research. Ongoing economic sanctions against Iran had hurt the heritage sector already, and many of my colleagues had vivid memories of the disastrous consequences of the illegal U.S. 2003 invasion of Iraq, with its senseless destruction of Baghdad and parts of its museum. The U.S. government and its allies had occupied strategically important world cultural heritage sites such as Babylon and Hatra at that time.³¹ Many people in the heritage sector in Iraq lost their lives, children were left without parents. Targeted operations supported by the U.S. military complex began later in Mosul in Iraq, and in Raqqa in Syria, and had also caused the complete destruction of entire museums in Yemen in 2015. These deliberate depredations of cultural heritage sites often operated on the basis of information shared by archaeologists and allies who either wittingly or unwittingly relayed data that assisted in missions of destruction. Standing firm the ground and arguing against the participation of individuals working in the heritage sector are Yannis Hamilakis, David Price and many other anthropologists.³² In January 2020, Price actually asked over social media whether it would be possible to sue those who had shared information in this way.³³

It was in this context that Sabine Schmidtke of the Institute of Advanced Studies in Princeton organized the panel “Iran at the Crossroads at Civilizations” in late January 2020. In preparation for this panel several colleagues reminded me of an email exchange that followed a few months after the illegal U.S. invasion of Iraq, when staff from the U.S. State Department reached out to the Archaeological Institute of America to ask whether it would share an invitation to collaborate to avoid any destruction of heritage sites and museums in case of an attack on Iran. Should we not be alerted by these developments?

Speaking at Princeton also gave me an opportunity to revisit and discuss a group of archives and correspondences I had been aware of before yet had not appreciated for their direct relevance to modern research on pigments and polychromy in Persepolis. Princeton had, after all, been a nexus of activity for some notable figures of twentieth-century archaeological inquiry on

³¹ Alcalá 2015; Bahrani 2006, 2008, 2010; Curtis 2011; I found particularly useful: Baker et al. 2010; Çubukçu 2018 and Kathem and Kareem Ali 2021.

³² Hamilakis 2009; Price 2016.

³³ As for earlier approaches to safeguard monuments in Iran from the outside, see the “Working Group for Greek-Iranian Antiquities Research in the Occupied Eastern Territories” set up in September 1942 by Alfred Rosenberg in Munich, supposed to check on objects of art and culture in occupied eastern territories: Wlach 2010.

Persepolis. In 1936, Ernst Herzfeld moved to the Institute for Advanced Study. He and his sister began living in a house on Bayard Lane No. 10, close to Thomas Mann and Albert Einstein. These streets in Princeton were also home of Donald Wilber (1907–97), an archaeologist and intelligence agent who claimed to have spearheaded the core group that overthrew a democratically elected government in Tehran in 1953. This orchestrated 1953 coup d'état in Tehran brought back a monarch in power.³⁴ Documentation proves that from Princeton and in Tehran, Wilber had worked through his channels with the U.S. State Department and a network of academics some of whom might not have been knowing participants in the efforts. Wilber himself had worked on Persepolis, had visited the site often, and became interested in the subject of color in architecture.³⁵ What I found remarkable was how Wilber's complex actions had almost been completely erased from the official narrative of U.S.–Iran relationships.³⁶

There I also rediscovered the letters of Ernst Herzfeld who feared for his collections, which he wanted to bring to America from his office at Persepolis. These collections included his many paper squeezes, fragments of painted plaster from Pasargadae, and much more. The correspondence detailed how the transport was arranged. Among other letters I rediscovered in the archives were some written by Ann Britt Tilia, who spent the 1974–5 academic year at Princeton writing up her discoveries at Persepolis. Tilia had secured her position there through a network of Richard Frye (1920–2014), Carl Nylander, and others then teaching on ancient Iran at institutions on the U.S. east coast. Tilia had already developed a friendship with Edith Porada (1912–94), then teaching at Columbia University in New York, and with the director of the Institute at Princeton, Homer A. Thompson (1906–2000), who had excavated at the Athenian Agora in Greece. Reading through this correspondence today, it becomes evident how pigment research, politics, and academia have always been closely intertwined. The archival documents offer glimpses into the years before the Iran–Iraq war between 1980 and 1989, which resulted in much destruction on both sides, including at sites such as Susa in Iran. In a handwritten letter from October 17, 1976, Tilia refers to a recently published article in a journal in Tehran, in which an author argued that “the Italians should now leave Persepolis and Dr. Judith Lerner should take their place.” Writing from Rome three years later in the summer of 1979, with her husband still in Tehran, Tilia reaffirmed her own interest in writing

³⁴ Wilber 1986. There are numerous more recent (and probably ongoing) cases in which the heritage sector collaborated on the overthrow of governments or is embedded in war zones or occupations. See, e.g., Mills and Rush 2017; Rush 2012.

³⁵ Wilber 1942, 1950, 1968, 1969, 1986. Wilber was instrumental in promoting the use of color slides in higher education institutions in America.

³⁶ Ghazvinian 2021.

more about the polychromy of Achaemenid art “and its possible connections with Egyptian, Assyro-Babylonian and also Greek art, but since Mrs. Judith Lerner had already announced her programme for such a study, I refrained from doing so.”³⁷ Rather, it was Donald Wilber whom Tilia thanked in the preface for the 1978 publication.

Tilia’s important yet short contributions and her essay on the colors at Persepolis was published in a volume that received favorable scholarly reviews. For all its significance, Tilia’s research unfortunately did not include technical studies on the pigments. During my own research into the whereabouts of the pigments discovered by Tilia with the team of Italians who came back to the site in 2008, I gleaned that the pigments from the 1970s which were removed from the site had been brought to Italy and subsequently lost. Judith Lerner, who had been the first to observe traces of paint on this one fragment from Persepolis at Harvard University had been given permission at Persepolis to remove and transfer pigments to the United States a few years earlier. These pigments are in fact the ones housed today in the Forbes Pigment Collection at the Harvard Art Museum, together with more than 2,700 samples of pigments from other cultures around the world.³⁸ These were analyzed subsequently in the laboratory. These vestiges of color manifested in small pigment samples bring us back full circle to how my own intellectual journey to help elucidate their meaning began.

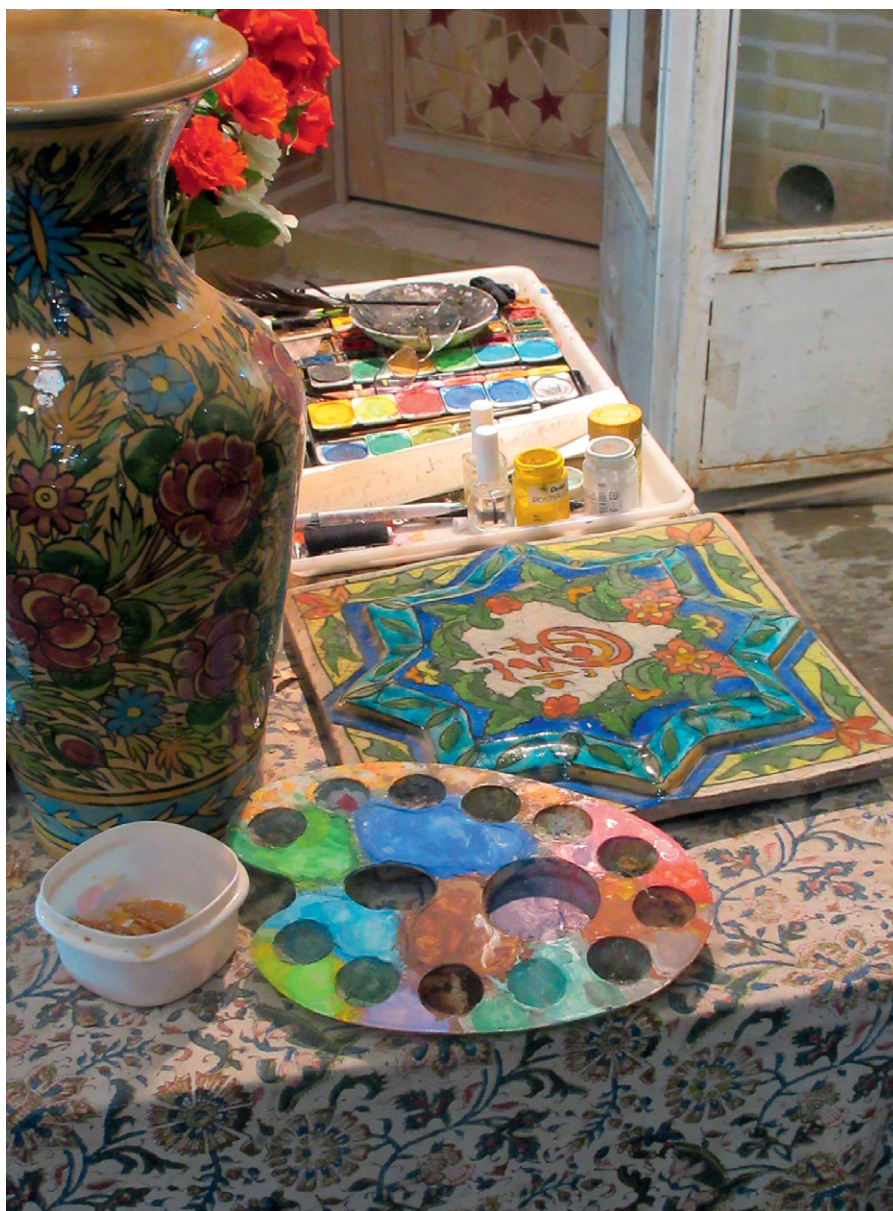
MAKING ACHAEMENID HISTORY: IN CLOSING

From the vantage point of the early twenty-first century, we can understand the excitement of Charles Texier, of Jane Dieulafoy, of Ernst Herzfeld, Judith Lerner, Ann Britt Tilia and everyone else who spotted traces of paint and polychromies in the Achaemenid materials while in the museum or excavating on the sites. Mistakes were made; documents were lost; stones were *whitewashed*. When we begin to analyze and investigate the surface of the monuments in Persepolis, uncovering paint layers and making cross-sections, it might at first be difficult to understand the historical consequences. In order to fully understand Achaemenid painting and polychromy, however, it is crucial to study how the paints and surface treatments were made and applied, and how they deteriorated over time. It is crucial to understand who painted the façades and who asked that we stop taking care of them. This

³⁷ Tilia added that her husband “has had great difficulties in carrying on with his work. . . . workmen revolted against him, and they even brought him to trial.” Part of this correspondence remains in the Edith Porada Archives, Morgan Library and Museum, New York City. I am grateful to María Isabel Molestina, Sidney Babcock and the entire staff of the Morgan Library and Museum for facilitating access to these documents.

³⁸ Finlay et al. 2018; Khandekar 2017; Stodulski et al. 1984.

knowledge should become a fully integrated part of research in the archaeology of Persepolis. As Figures 6.9 and 6.10 taken in the streets of Isfahan and Shiraz demonstrate, polychrome works of art continue to inspire us. Continuing to examine the surface of stone facades and disentangle aspects of the research processes of painting and attitudes toward polychrome works of art in Iran is a very exciting adventure to participate in.



6.9. Paint palette, Isfahan bazar, 2016. Photo: Author



6.10. Modern decorative street art sculpture in Shiraz, 2016. Photo: Julian Decyk

BIBLIOGRAPHY

- Abbate, Lia. 1994. "Wall Paintings from a Neo-Assyrian Building at Til Barsib." *Abr-Nahrain* 32: 7–16.
- Abbe, Mark. 2015. "Polychromy." In *The Oxford Handbook of Roman Sculpture*, edited by Elise Friedland and Melanie Grunow Sobocinski with Elaine Gazda, 173–88. Oxford: Oxford University Press.
- Abdali, Negar. 2018. "Glazed Artefacts in Elam and North-Western Iran: A Common Technology?" In *Elam and Its Neighbours. Recent Research and New Perspectives*, edited by Behzad Mofidi-Nasrabadi, Doris Prechel, and Alexander Pruss, 155–68. Hildesheim: Verlag Franzbecker.
- Abdi, Kamyar. 1994. "One Hundred and Thirty Years of Excavations at Susa." [in Persian] *Mīrās-e farhangi* 12: 87–106.
2001. "Nationalism, Politics and the Development of Archaeology in Iran." *American Journal of Archaeology* 105 (1): 51–76.
2002. "Notes on the Iranianization of Bes in the Achaemenid Empire." In "Medes and Persians: Reflections on Elusive Empires," edited by Margaret Cool Root. *Art Orientalis* 32: 133–62.
- Abdi, Kamyar, S. Zareh, H. Sallehi, and H. Baghai. 2009. "The State of Preservation of the Site of Susa." [in Persian] *Bastanpazhuhi (Archaeognosy): Persian Journal of Iranian Studies (Archaeology)* 2009: 8–29.
- Abkai Khavari, Manijeh. 2000. *Das Bild des Königs in der Sasanidenzeit: Schriftliche Überlieferungen im Vergleich mit Antiquaria*. Hildesheim: Verlag Franzbecker.
- Adachi, Takuro. 2008. "Achaemenid and Post-Achaemenid Objects from TB 75, TB 130 and the General Survey." In *Tang-e Bolaghi. The Iran-Japan Archaeological Project for the Sivand Dam Salvage Area*, edited by Akira Tsuneki and Mohsen Zeidi, 123–31. Tsukuba: University of Tsukuba.
- Adler, Cyrus. 1895. "Two Persepolitan Casts in the U.S. National Museum." *Annual Report of the Board of Regents of the Smithsonian Institution*, 749–53. Washington, DC: Smithsonian Institution.
- Adornato, Gianfranco, Eva Falaschi, and Alessandro Poggio, eds. 2019. *Pittori, tecniche, trattati, contesti tra testimonianze e ricezione. Archeologia e arte antica*. Milano: LED Edizioni.
- Affonso, M. 1996. "Lapis Lazuli aus Afghanistan und Chile. Ein Einblick in Geschichte und Geologie." *Metalla* 3 (2): 71–82.
- Aggelakopoulou, Eleni and Asterios Bakolas. 2022. "What Were the Colors of the Parthenon? Investigation of the Entablature's Cornice Blocks." *Journal of Archaeological Science* 140: 1–18. <https://doi.org/10.1016/j.jas.2022.105553>
- Aggelakopoulou, Eleni, Sophia Sotiropoulou, and Georgios Karagiannis. 2022. "Architectural Polychromy on the Athenian Acropolis: An In Situ Non-Invasive Analytical Investigation of the Colour Remains." *Heritage* 5 (2): 756–87. <https://doi.org/10.3390/heritage5020042>
- Agnew, Neville and Janet Bridgland, eds. 2006. *Of the Past, for the Future: Integrating Archaeology and Conservation. Proceedings of the Conservation Theme at the 5th World Archaeological Congress, Washington, DC 22–26 June 2003*. Los Angeles: Getty Conservation Institute.
- Ahmadinezhad, Sahar, Antonio Sansonetti, Andrea Pane, and Danilo Biondelli. 2020.

- "Study of Decay Patterns and Damage Assessment of the Achaemenian Rock-Reliefs of Naqsh-e Rostam." In *Monument Future: Decay and Conservation of Stone. Proceedings of The 14th International Congress on the Deterioration and Conservation of Stone*, edited by Siegfried Siegesmund and Bernhard Middendorf, 71–6. Halle: Mitteldeutscher Verlag.
- Albenda, Pauline. 1986. *The Palace of Sargon, King of Assyria. Monumental Wall Reliefs at Dur-Sharrukin, from Original Drawings Made at the Time of Their Discovery in 1843–44 by Botta and Flandin*. Paris: Editions Recherche sur les Civilisations.
2005. *Ornamental Wall Painting in the Art of the Assyrian Empire*. Leiden: Brill.
- Alcala, Ronald. 2015. "Babylon Revisited: Reestablishing a Corps of Specialists for the Protection of Cultural Property in Armed Conflict." *Harvard National Security Journal* 6: 206–54.
- Aldenhoven, C. 1896. "Farbige Gipse." *Die Nation* 13: 200–2.
- Alexander, James E. 1827. *Travels from India to England: Comprehending a Visit to the Burman Empire, and a Journey through Persia, Asia Minor, European Turkey, etc. in the Years 1825–26*. London: Parbury, Allen & Co.
- Aliani, F., Ali Alirezai, A. Moradian, and Z. Abbaslo. 2009. "Geochemistry and Petrography of the Meiduk Porphyry Copper Deposit, Kerman, Iran." *Australian Journal of Basic and Applied Sciences* 3 (4): 3786–800.
- Aliatis, I., D. Bersani, E. Campani, A. Casoli, P. P. Lottici, S. Mantovan, I.-G. Marino, and F. Ospitali. 2009. "Green Pigments of the Pompeian Artist's Palette." *Spectrochimica Acta Part A* 73: 532–8.
- Aliatis, I., D. Bersani, E. Campani, A. Casoli, P. P. Lottici, S. Mantovan, and I.-G. Marino. 2010. "Pigments Used in Roman Wall Paintings in the Vesuvian Area." *Journal of Raman Spectroscopy* 41 (11): 1537–42. <https://doi.org/10.1002/jrs.2701>
- Alibaigi, Sajjad and Iraj Rezaei. 2018. "Bikni, Bit-tabti, and uqnu: Searching for Toponymns an Terms mentioned in Neo-Assyrian texts." *Journal of Near Eastern Studies* 77.1: 15–30.
- Alizadeh, Abbas. 2017. "Colossal Bull Head." In *Highlights of the Collections of the Oriental Institute Museum*, edited by Jean Evans, Jack Green, and Emily Teeter, 137. Chicago: The Oriental Institute.
- Allen, Lindsay. 2005. *The Persian Empire. A History*. Chicago: University of Chicago Press.
2007. "'Chilminar sive Persepolis': European Reception of a Persian Ruin." In *Persian Responses: Political and Cultural Interaction with(in) the Achaemenid Empire*, edited by Christopher Tuplin, 313–42. Swansea: Classical Press of Wales.
2009. "The Persepolis Diaspora in North American Museums. From Architecture to Art." Unpublished presentation at the Annual Meeting of the American Schools of Oriental Research, New Orleans, LA.
2013. "From Silence: A Persepolis Relief in the Victoria and Albert Museum." *V and A Online Journal* no. 5. www.vam.ac.uk/content/journals/research-journal/issue-no.-5-2013/from-silence-a-persepolis-relief-in-the-victoria-and-albert-museum/
2016. "The Greatest Enterprise: Arthur Upham Pope, Persepolis and Achaemenid Antiquities." In *Arthur Upham Pope and a New Survey of Persian Art*, edited by Yuka Kadoi, 127–68. Leiden: Brill.
- Allen, Lindsay and Moya Carey. 2021. "Éminences grises: Emergent Antiquities in Seventeenth-Century Iran." In *Afterlives of Ancient Rock-Cut Monuments in the Near East*, edited by Jonathan Ben-Dov and Felipe Rojas, 272–344. Leiden: Brill.
- Aloiz, Emily, Janet Douglas, and Alexander Nagel. 2016. "Painted Plaster and Glazed Brick Fragments from Achaemenid Pasargadae and Persepolis, Iran." *Heritage Science* 4 (3). <https://doi.org/10.1186/s40494-016-0072-7>
- Alvarez-Mon, Javier. 2005. "Aspects of Elamite Wall Painting: New Evidence from Kabnak (Haft Tappeh)." *Iranica Antiqua* 40: 149–64.
- 2009a. "The Introduction of Cotton in the Near East: A View from Elam." In *Draya*

- Tya haca Pars aitiy: Essays on the Archaeology and History of the Persian Gulf Littoral*, edited by Kamyar Abdi, 1–17. Oxford: Archaeopress.
- 2009b. “Notes on the ‘Elamite’ Garment of Cyrus the Great.” *The Antiquaries Journal* 89: 21–34.
2010. *The Arjān Tomb: At the Crossroads of the Elamite and the Persian Empires*. Leuven: Peeters.
2012. “Braids of Glory: Art and Culture of the Elamite Highlands.” In *Susa and Elam. Archaeological, Philological, Historical and Geographical Perspectives*, edited by Katrien de Graef and Jan Tavernier, 207–48. Leiden: Brill.
2021. “Elamite Traditions.” In *A Companion to the Achaemenid Persian Empire*, edited by Bruno Jacobs and Robert Rollinger, 389–402. Hoboken, NJ: Wiley.
- Alvarez-Mon, Javier, Gian-Pietro Basello, and Yasmina Wicks, eds. 2018. *The Elamite World*. London: Routledge.
- Alvarez-Mon, Javier and Mark Garrison, eds. 2011. *Elam and Persia*. Winona Lake, IN: Eisenbrauns.
- Amadori, Maria Letizia, Mohammadamin Emami, Paolo Pallante, and Paola Fermo. 2017. “Micro-Invasive Investigations on Bricks and Glazed Bricks from Tol-e Ajori.” In *From Palace to Town: Report on the Multidisciplinary Project Carried Out by the Iranian-Italian Joint Archaeological Mission on the Persepolis Terrace (Fars, Iran), 2008–2013*, edited by Alireza Askari Chaverdi and Pierfrancesco Callieri, 59–110. Rome: BraDypUS Communicating Cultural Heritage.
- Amadori, Maria Letizia, Manuela Vagnini, Riccardo Vivani, Chiara Anselmi, Alireza Askari Chaverdi, Pierfrancesco Callieri, Emad Martin, and Valeria Mengaci. 2021. “Advances in Characterization of Colourful Residues Unearthed in Persepolis West Craft Zone Using Microscopic and Spectroscopic Techniques.” *Microchemical Journal* 167 (August). <https://doi.org/10.1016/j.microc.2021.106304>
- Amanat, Abbas. 2011. “Court Patronage and Public Space. Abu l’Hasan Sani al-Mulk and the Art of Persianizing the Other in Qajar Iran.” In *Court Cultures in the Muslim World: Seventh to Nineteenth Centuries*, edited by Albrecht Fuess and Jan-Peter Hartung, 408–44. London: Routledge.
- Ambers, Janet and St John Simpson. 2005. “Some Pigment Identifications for Objects from Persepolis.” *ARTA* 2005 (2): 1–13. <http://www.achemenet.com/ressources/enligne/arta/pdf/2005.002-Ambers-Simpson.pdf>
- Amiet, Pierre. 1972. “Les ivoires achéménides de Suse.” *Syria* 49: 167–91, 319–37.
2013. “Decorative Arts at Susa during the Persian Period.” In *The Palace of Darius at Susa: The Great Royal Residence of Achaemenid Persia*, edited by Jean Perrot, 330–46. London: I. B. Tauris.
- Amiet, Pierre, Nicole Chevalier, and Elizabeth Carter. 1992. “Susa in the Ancient Near East.” In *The Royal City of Susa. Ancient Near Eastern Treasures in the Louvre*, edited by Prudence O. Harper, Joan Aruz, and Françoise Tallon, 1–24. New York: Metropolitan Museum of Art.
- Aminpur, B. 2006. “Archaeogeophysics and Magnetometry Survey in Ancient Sites around Persepolis.” [in Persian] *Bastanpazhuhi (Archaeognosy): Persian Journal of Iranian Studies (Archaeology)* 1: 18–21.
- Aminzadeh, Behnaz and Firuzeh Samani. 2006. “Identifying the Boundaries of the Historical Site of Persepolis Using Remote Sensing.” *Remote Sensing of Environment* 102: 52–62.
- Aminzadeh, S. 2004. “An Examination of the Unfinished Tomb at Persepolis and Some Suggestions for Its Restoration According to Other Restored Achaemenid Tombs.” [in Persian] *Parsa* 1 (1): 120.
- Amrhein, Anastasia, Clare Fitzgerald, and Elizabeth Knott, eds. 2019. *A Wonder to Behold: Craftsmanship and the Creation of Babylon’s Ishtar Gate*. Princeton, NJ: Princeton University Press.

- Andrae, Walter. 1923. *Farbige Keramik aus Assur und ihre Vorstufen in altassyrischen Wandmalereien*. Berlin: Scarabeus-Verlag.
- André-Salvini, Béatrice. 2013. "The Palace Decoration of Susa in the Louvre." In *The Palace of Darius at Susa. The Great Royal Residence of Achaemenid Persia*, edited by Jean Perrot, 296–300. London: I. B. Tauris.
- André-Salvini, Béatrice and Michel Borbon. 2000. "Le décor en briques polychromes du palais de Darius Ier à Suse dans les collections du Louvre." *Coré. Conservation et restauration du patrimoine culturel* 9 (November): 16–26.
- Anonymous. 1854a. "The Crystal Palace, Sydenham. The Crystal Palace and Its Influence on the Arts." *The Civil Engineer and Architects Journal* 17 (244): 241–6.
- 1854b. "School of Sculpture at Sydenham." *The Art Journal (London)*: 256–9.
1855. "Review of the Nineveh Court." *The London Quarterly Review* (April): 157–83.
1874. *An Inventory of Plaster Casts in Various Styles, Including the Antique and the Renaissance, Acquired by the South Kensington Museum*. London: Victoria and Albert Museum.
1892. "Casts from Sculptures at Persepolis." *The London Times* (September 9): 5.
- Anonymous, ed. 1998. *Regards sur la Perse antique à l'occasion des expositions à l'Église Saint-Cyran du Blanc (Indre) et au Musée d'Argentomagus à Saint-Marcel (Indre) du 21 juin au 20 septembre 1998*. Le Blanc, Saint-Marcel: Amis de la Bibliothèque municipale du Blanc; Musée d'Argentomagus.
- Antonini, Sabina. 2012. *South Arabian Art. Art History in Pre-Islamic Yemen*. Paris: De Boccard.
- Aoki, Shigeo, Yoko Taniguchi, Stephen Rickerby, Michiyo Mori, Takayasu Kijima, Su Bomin, and Fumiyoshi Kirino, eds. 2021. *Conservation and Painting Techniques of Wall Paintings on the Ancient Silk Road*. Dordrecht: Cultural Heritage Science.
- Appolonia, L., Radicati, B., Piccirillo, A., and V. Chatel. 2008. "La Materia e i Colori." In *Nisa Partica. Ricerche nel complesso monumentale Arsacide*, edited by Antonio Invernizzi and Carlo Lippolis, 197–209. Florence: Le Lettere.
- Ardalan, Nader. 1974. "Color in Safavid Architecture: The Poetic Diffusion of Light." *Iranian Studies* 7: 164–78.
- Ardestani, N. 2004. "An Examination on the Detrimental Effects Resulted from Usage of Concrete Mortar on the Stone Monuments at Persepolis." [in Persian] *Parsa* 1 (1): 88–96.
- Arfaee, Abdolmajid. 2008a. "The Geographical Background of the Persepolis Tablets." PhD diss. University of Chicago. ProQuest (AAT 3300414).
- 2008b. *Persepolis Fortification Tablets*. Tehran.
- 2008c. "PT 10a, collated and completed." *ARTA* 2008 (1): 1–8. www.achemenet.com/pdf/arta/2008.001-Arfai.pdf
- Arnold, Thomas. 1965. *Painting in Islam. A Study of the Place of Pictorial Art in Muslim Culture*. With a new introduction by B. W. Robinson. New York: Dover Publications.
- Askari Chaverdi, Alireza and Pierfrancesco Callieri. 2012. "The Activities of the Iranian–Italian Joint Archaeological Mission at Persepolis West (Fars, Iran). First Results of the Studies on the Pottery of Achaemenid and Post-Achaemenid Age." In *Persepolis and Its Settlements. Proceedings of the Conference Held in Viterbo, 16–17th December 2010*, edited by Gian-Pietro Basello and Adriano Rossi, 100–22. Naples: Università di Napoli "L'Orientale."
2015. "In Search of the Elusive Town of Persepolis. A Preliminary Report on the Activities of the Iranian–Italian Joint Archaeological Mission in Fars, Iran." In *Studies on the Iranian World*. Vol. 1, *Before Islam*, edited by Anna Krasnowolska and Renata Rusek-Kowalska, 239–51. Krakow: Jagiellonian University Press.
- eds. 2017a. *Persepolis West (Fars, Iran): Report on the Field Work Carried out by the Iranian–Italian Joint Archaeological Mission in 2008–2009*. London: British Archaeological Reports.

- eds. 2017b. *From Palace to Town: Report on the Multidisciplinary Project Carried Out by the Iranian-Italian Joint Archaeological Mission on the Persepolis Terrace (Fars, Iran), 2008–2013*. Rome: BraDypUS Communicating Cultural Heritage.
- Askari Chaverdi, Alireza, Pierfrancesco Callieri, and Sébastien Gondet. 2013. "Tol-e Ajori, a New Monumental Building in Parsa: Preliminary Cross Interpretations from Recent Surveys and Excavations Works around Persepolis (2005–2012)." *ARTA* 2013 (6). www.achemenet.com/pdf/arta/ARTA_2013.006-Askari-Callieri-Gondet.pdf
- Askari Chaverdi, Alireza, Pierfrancesco Callieri, and Emad Matin. 2014. "Tol-e ajori: A Monumental Gate of the Early Achaemenian Period in the Persepolis Area. The 2014 Excavation Season of the Iranian-Italian Project, From Palace to Town." *Archäologische Mitteilungen aus Iran und Turan* 46: 223–54.
2017. "The Monumental Gate at Tol-e Ajori, Persepolis (Fars). New Archaeological Data." *Iranica Antiqua* 52: 205–58.
- Askari Chaverdi, Alireza, Pierfrancesco Callieri, Marisa Laurenzi Tabasso, and Lorenzo Lazzarini. 2016. "The Archaeological Site of Persepolis (Iran): Study of the Finishing Technique of the Bas-Reliefs and Architectural Surfaces." *Archaeometry* 58 (1): 17–34.
- Athenaios (=Athenaeus of Naucratis). *The Deipnosophists*. With an English translation by C. B. Gulick. Cambridge, MA: Loeb Classical Library.
- Aufrère, Sydney. 1991. *L'univers minéral dans la pensée égyptienne*. Cairo: Institut français d'archéologie orientale.
2001. "The Egyptian Temple, Substitute for the Mineral Universe." In *Colour and Painting in Ancient Egypt*, edited by Vivian W. Davies, 158–63. London: British Museum Press.
- Augusti, Selim. 1967. *I colori pompeiani*. Rome: De Luca.
- Azarpay, Guitty. 1981. *Sogdian Painting*. Berkeley: University of California Press.
- Babaie, Susan. 2008. *Isfahan and Its Palaces: Statecraft, Shi'ism and the Architecture of Conviviality in Early Modern Iran*. Edinburgh: Edinburgh University Press.
- Bachmann, Hans-Gert and Wolfgang Csyzsk. 1977. "Das Grab eines römischen Malers aus Nida-Hedderheim." *Germania* 55: 85–107.
- Bahrani, Zainab. 2006. "Babylon: A Case Study in the Military Occupation of an Archaeological Site." In *Of the Past, for the Future: Integrating Archaeology and Conservation, Proceedings of the Conservation Theme at the 5th World Archaeological Congress, Washington, DC 22–26 June 2003*, edited by Agnew Neville and Janet Bridgland, 240–6. Los Angeles: Getty Conservation Institute.
2008. "The Battle for Babylon." In *The Destruction of Cultural Heritage in Iraq*, edited by Peter Stone and Joanne Farchakh Bajjali, 165–71. Melton: Boydell Press.
2010. Archaeology and the Strategies of War." In *Cultural Cleansing in Iraq*, edited by Raymond Baker, Shereen Ismael, and Tareq Ismael, 67–81. London: Pluto Press.
2017. *Art of Mesopotamia*. London: Thames & Hudson.
- Bahrani, Zainab, Zeynep Celik, and Edhem Eldem, eds. 2011. *Scramble for the Past: A Story of Archaeology in the Ottoman Empire, 1753–1914*. Istanbul: Salt/Garanti Kültür A.S.
- Baines, John. 1985. "Colour Terminology and Colour Classification: Ancient Egyptian Colour Terminology and Polychromy." *American Anthropologist* 87: 282–97.
- Baker, Raymond, Shereen Ismael, and Tareq Ismael, eds. 2010. *Cultural Cleansing in Iraq. Why Museums Were Looted, Libraries Burned, and Academics Murdered*. London: Pluto Press.
- Balatti, Silvia. 2019. "Kleider fuer den Grosskoenig. Fabrikation und Umlauf von Textilien am Hof der Achaemeniden." In *Gaben, Waren und Tribute*, edited by Beate Wagner-Hasel and Marie-Louise Nosch, 93–116. Stuttgart: Franz Steiner Verlag.

- Balcer, Jack M. 1978. "Alexander's Burning of Persepolis." *Iranica Antiqua* 13: 119–33.
1991. "Erich Friedrich Schmidt, 13 September 1897–3 October 1964." In *Sancti-Weerdenburg and Drijvers* 1991, 147–72.
- Barbotin, Christophe. 2014. "Couleur, matériau et lumière: la pensée chromatique dans l'Égypte ancienne." In "Thérapie. Polychromie et restauration de la sculpture dans l'Antiquité," special volume, edited by Brigitte Bourgeois. *Technè* no. 40: 23–9.
- Bareš, Ladislav and Květa Smoláriková. 1999. *The Shaft Tomb of Udjahorresnet at Abusir. Abusir IV*. Prague: Czech Institute of Egyptology.
- Barnett, Richard D. 1957. "Persepolis." *Iraq* 19: 55–77.
- Basello, Gian-Pietro. 2012. "Doorknobs, Nails or Pegs? The Function(s) of the Elamite and Achaemenid Inscribed Knobs." In *Persepolis and Its Settlements. Proceedings of the Conference Held in Viterbo, 16–17th December 2010*, edited by Gian-Pietro Basello and Adriano Rossi, 1–66. Naples: Università di Napoli "L'Orientale."
2017. "Two New Fragments of Cuneiform Inscriptions on Glazed Bricks from the Iranian-Italian Excavations at Tol-e Ajori (Fars)." *Iranica Antiqua* 52: 259–81.
2018. "Administrative Topography in Comparison: Overlapping Jurisdiction between the Susa Acropole Tablets and the Persepolis Fortification Tablets." In *Topography and Toponymy in the Ancient Near East. Perspectives and Prospects*, edited by Jan Tavernier, Elynn Gorris, Kathleen Abraham, and Vanessa Boschloo, 217–66. Leuven: Peeters.
- Basello, Gian-Pietro and Adriano Rossi, eds. 2012. *Persepolis and Its Settlements. Proceedings of the Conference held in Viterbo, 16–17th December 2010*. Naples: Università di Napoli "L'Orientale."
- Batchelor, David. 2000. *Chromophobia*. London: Reaktion Books.
- Battesti, Teresa. 2011. "Lumière de gloire et royauté en Iran." In *Regalia. Emblèmes et rites du pouvoir*, edited by Yves Vadé and Bernard Dupaigne, 165–86. Paris: L'Harmattan.
- Bauer, Johannes and Winfried Geominy. 2000. *Gips nicht mehr. Abgüsse als letzte Zeugen antiker Kunst*. Bonn: Akademisches Kunstmuseum.
- Bazin, D. and H. Hübner 1969. "Copper Deposits in Iran." Report 13. Tehran: Geological Survey of Iran.
- Bazljou, M. 2004a. "A Review of the History of Modernism-Based Conservation and Restoration." [in Persian] *Parsa* 1 (1): 64–73.
- 2004b. "An Introduction to Designing of Stone Strengthening and Upkeeping Systems at Persepolis." [in Persian] *Parsa* 1 (1): 74–87.
- Béarat, Hamdallah, Michel Fuchs, Marino Maggetti, and Daniel Paunier, eds. 1997. *Roman Wall Painting: Materials, Techniques, Analysis and Conservation. Proceedings of the International Workshop at Fribourg, 7–9 March 1996*. Fribourg: University of Fribourg.
- Becker, Hilary. 2020. "Grading for Colour: Pliny's Hierarchy of Pigment Quality." In *The Nature of Art: Pliny the Elder on Materials*, edited by Anna Anguissola and Andreas Grüner, 194–200. Turnhout: Brepols.
2021. "Color Technology and Trade." In *Cultural History of Color*, edited by David Wharton, 35–48. London: Bloomsbury.
- Bellmer, Elizabeth. 1999. "The Statesman and Ophthalmologist: Gladstone and Magnus on the Evolution of Human Colour Vision, One Small Episode of the 19th Century Darwinian Debate." *Annals of Science* 56: 25–45.
- Benoit, Agnes. 2004. "Susa." In *Persiens Antike Pracht. Bergbau, Handwerk, Archäologie*, edited by Thomas Stöllner, Rainer Slotta, and Abdolrasool Vatandoust, 178–93. Bochum: Deutsches Bergbau-Museum.
- Benveniste, Émile. 1951. "Une inscription perse achéménide du Cabinet des médailles." *Journal Asiatique* 239: 261–73.
- Benvenuto, Maria Carmela. 2019. "Iranian Color Terms in Aramaic Documents from

- Ancient Bactria,” In *Iranian Studies in Honour of Adriano V. Rossi*, edited by Sabir Badalkhan, Gian-Pietro Basello, and Matteo De Chiara, 97–110. Naples: Università di Napoli “L’Orientale.”
- Berchtold, M. 1987. “Gipsabgüsse und Original. Ein Beitrag zur Geschichte von Werturteilung.” PhD diss., Universität Stuttgart.
- Berlin, Brent and Paul Kay. 1969. *Basic Color Terms; Their Universality and Evolution*. Berkeley: University of California Press.
- Berman, Lawrence with Kenneth Bohac. 1999. *The Cleveland Museum of Art. Catalogue of Egyptian Art*. Cleveland: Cleveland Museum of Art.
- Besnard, Tiphaine-Annabelle. 2019. “Un Revival haut en couleur! (Re)présenter la polychromie antique dans la sculpture contemporaine.” In *Restituer les couleurs. Le rôle de la restitution dans les recherches sur la polychromie, en sculpture, architecture et peinture murale. Actes du colloque 29-30 novembre et 1er décembre 2017*, edited by Maud Mulliez, 219–25. Bordeaux: Ausonius éditions.
- Bewer, Francesca. 2010. *A Laboratory for Art: Harvard’s Fogg Museum and the Emergence of Conservation in America, 1900–1950*. Cambridge, MA: Harvard Art Museum; New Haven, CT: Yale University Press.
- Bille, Mikkel and Tim Flohr Sørensen. 2007. “An Anthropology of Luminosity. The Agency of Light.” *Journal of Material Culture* 12: 263–84.
- Billerbeck, Adolf. 1893. *Susa. Eine Studie zur alten Geschichte Westasiens*. Leipzig: J. C. Hinrichs.
- Billot, Marie-Françoise. 1982. “Recherches aux XVIIIe et XIXe siècles sur la polychromie de l’architecture grecque.” In *Paris-Rome-Athènes. Le voyage en Grèce des architectes français aux XIX et XX siècles* (exhibition catalogue), 61–125. Paris: Ecole nationale supérieure des Beaux-Arts.
- Binandeh, Ali, Bahman Kargar, and Behruz Khanmohamadi. 2017. “Mannaeen Art: Some Glazed Bricks from Qalaichi, Iran.” *Aula Orientalis* 35 (2): 213–22.
- Biscontin, Guido and Stefano Volpin, eds. 1990. *Superfici dell’architettura: le finiture. Atti del convegno di studi. Bressanone 20–29 giugno*. Padua: Libreria Progetto Editore.
- Bissing, Friedrich Wilhelm, von. 1898. “Zur Polychromie altägyptischer Skulptur.” *Recueil de travaux relatifs à la philologie et à l’archéologie égyptiennes et assyriennes* 20: 120–4.
- Blänsdorf, Catharina. 2005. “Neue Untersuchungen zur Farbigkeit der Terrakottaarmee: Knieende Bogenschützen und Musterborten der Offiziere.” In *Jahresbericht 2004. Erprobung und Optimierung von Konservierungstechnologien für Kunst- und Kulturgüter der Provinz Shaanxi, VR China*, 8–19. Hanover: Technische Informationsbibliothek u. Universitätsbibliothek.
2008. “Die Farbrekonstruktionen zweier Krieger der Terrakottaarmee des ersten chinesischen Kaisers.” In *Begegnung in Bunt. Farbfassungen antiker chinesischer und griechischer Plastik im Vergleich; Sonderausstellung des Museums für Abgüsse Klassischer Bildwerke München anlässlich der XXIX. Olympischen Spiele in Peking, 18. Juni bis 29. August 2008*, edited by Ingeborg Kader, 9–41. Munich: Museum für Abgüsse Klassischer Bildwerke.
2021. “Materials and Techniques of the Polychromy of the Giant Buddha Statues in Bamiyan.” In *Conservation and Painting Techniques of Wall Paintings on the Ancient Silk Road*, edited by Shigeo Aoki, Yoko Taniguchi, Stephen Rickerby, Michiyo Mori, Takayasu Kijima, Su Bomin, and Fumiyoshi Kirino, 157–76. Dordrecht: Springer.
- Blänsdorf, Catharina, Erwin Emmerling, and Michael Petzet, eds. 2001. *The Polychromy of Antique Sculptures and the Terracotta Army of the First Chinese Emperor*. Munich: Bayerisches Landesamt für Denkmalpflege.
- Blanc, C. 1867. *Grammaire des arts du dessin*. Paris: Librairie Renouard. Translated by K. Newell Doggett as *The Grammar of Painting and Engraving* (Chicago: S.C. Griggs and Co., 1891).

- Bloedow, Edmund and Heather Loube. 1997. "Alexander the Great 'under Fire' in Persepolis." *Klio* 79: 341–53.
- Blom-Böer, Ingrid. 1994. "Zusammensetzung altägyptischer Farbpigmente und ihre Herkunftslagerstätten in Zeit und Raum." *Oudheidkundige Mededelingen uit het Rijksmuseum van Oudheden* 74: 55–107.
- . 2020. "The Composition of the Colour Palette and the Socio-Economic Role of Pigments Used in Egyptian Painting." In *The Value of Colour. Material and Economic Aspects in the Ancient World*, edited by Shiyanthi Thavapalan and David Warburton, 231–55. Berlin: Excellence Cluster Topoi.
- Bloom, Jonathan and Sheila Blair, eds. 2011. *And Diverse Are Their Hues. Color in Islamic Art and Culture*. New Haven, CT: Yale University Press.
- Blum, Hartmut. 1998. *Purpur als Statussymbol in der griechischen Welt*. Bonn: R. Habelt.
- Blume, Clarissa. 2015. *Polychromie hellenistischer Skulptur: Ausführung, Instandhaltung und Botschaften*. Petersberg: Michael Imhof Verlag.
- Blume-Jung, Clarissa. 2020. "Ganosis and Kosmesis in Pliny's Natural History. On the Polishing of Marble Sculptures with Wax." In *The Nature of Art: Pliny the Elder on Materials*, edited by Anna Anguissola and Andreas Grüner, 100–11. Turnhout: Brepols.
- . 2021. "The Polychromy of Palmyrene Portraits: Workmen and Colouration." In *Production Economy in Greater Roman Syria: Trade Networks and Production Processes*, edited by Rubina Raja and Julia Steding, 33–48. Turnhout: Brepols.
- Blümner, Heinrich. 1912. *Technologie und Terminologie der Gewerbe und Künste bei Griechen und Römern*. 4 vols. Leipzig: B. G. Teubner. Reprint, Hildesheim: Georg Olms, 1969.
- Boardman, John. 1959. "Chian and Early Ionic Architecture." *The Antiquaries' Journal* 39: 170–218.
- Bohrer, Frederick. 2003. *Orientalism and Visual Culture: Imagining Mesopotamia in Nineteenth-Century Europe*. Cambridge: Cambridge University Press.
- Boldrick, Stacey, David Park, and Paul Williamson. 2002. *Wonder: Painted Sculpture from Medieval England*. Leeds: Henry Moore Institute.
- Bollati, Ariela. 2008. "Le sculpture in argilla cruda dipinta." In *Nisa Partica. Ricerche nel complesso monumentale Arsacide*, edited by Antonio Invernizzi and Carlo Lippolis, 167–96. Florence: Le Lettere.
- Bomford, David and Mark Leonard, eds. 2004. *Issues in the Conservation of Paintings*. Los Angeles: Getty Conservation Institute.
- Bonaduce, Ilaria, Catharina Blänsdorf, Patrick Dietemann, and Maria Perla Colombini. 2008. "The Binding Media of the Polychromy of Qin Shihuang's Terracotta Army." *Journal of Cultural Heritage* 9 (1): 103–8. <https://doi.org/10.1016/j.culher.2007.08.002>
- Bonomi, Joseph. 1853. *Nineveh and Its Palaces. The Discoveries of Botta and Layard, Applied to the Elucidation of Holy Writ*. London: Ingram, Cooke & Co.
- Borg, Alexander, ed. 1999. *The Language of Color in the Mediterranean: An Anthology on Linguistic and Ethnographic Aspects of Color Terms*. Stockholm: Almqvist & Wiksell International.
- Botta, Paul-Émile. 1843. "Lettres de M. Botta sur ses découvertes près de Ninive." *Journal Asiatique* 4 (2): 61–72, 201–14 and 4 (3): 91–103, 424–35.
- . 1844. "Lettres de M. Botta sur ses découvertes près de Ninive." *Journal Asiatique* 4 (4): 301–14.
- Botta, Paul-Émile and Eugène Flandin. 1846–50. *Monument de Ninive*. 5 vols. Paris: Imprimerie nationale.
- Bötticher, K. 1872. *Erklärendes Verzeichnis der Abgüsse antiker Werke im königlichen Museum zu Berlin*. 2nd ed. Berlin: Königliche Museen zu Berlin Abtheilung für Gypsabgüsse.
- Boucharlat, Rémy. 2001. "The Palace and the Royal Achaemenid City: Two Case Studies: Pasargadae and Susa." In *The*

- Royal Palace Institution in the First Millennium bc. Regional Development and Cultural Interchange between East and West*, edited by Inge Nielsen, 113–23. Athens: Danish Institute at Athens.
2013. “Other Works of Darius and His Successors.” In *The Palace of Darius at Susa: The Great Royal Residence of Achaemenid Persia*, edited by Jean Perrot, 359–408. London: I. B. Tauris.
2019. “Decors de stucs dans les residences Sassanides en Iran. Recente decouvertes.” In *Stucs d’Orient. Traditions orientales et cultures hellénisées*, edited by Jacqueline Dentzer-Feydy, Anne-Marie Guimier-Sorbets, and Christiane Delplace, 351–66. Beirut: Presses de l’Ifpo.
2020. “Arriving at Persepolis, an Unfortified Royal Residence.” In *The Art of Empire in Achaemenid Persia: Studies in Honour of Margaret Cool Root (Achaemenid History 16)*, edited by Elspeth Dusingberre, Mark Garrison, and Wouter F. Henkelman, 41–71. Leiden: Netherlands Institute for the Near East.
2021. “Persia (including Khuzestan)” In *A Companion to the Achaemenid Persian Empire*, edited by Bruno Jacobs and Robert Rollinger, 189–212. Hoboken, NJ: Wiley.
- Bourgeois, Brigitte. 2008. “Un peuple d’ombres.” Quatremère de Quincy et les couleurs de l’antiquité, au Louvre, vers 1800. *Techné* nos. 27–28: 161–8.
2012. “Marbre blanc, taches de couleur. Polychromie et restauration de la sculpture grecque.” In *La Restauration des Peintures et des Sculptures: Connaissance et Reconnaissance de l’Oeuvre*, edited by Pierre-Yves Kairis, Béatrice Sarrazin and François Trémolières, 25–42. Paris: Armand Colin.
- ed. 2014a. “Thérapie. Polychromie et restauration de la sculpture dans l’Antiquité.” *Techné* no. 40 (special volume).
- 2014b. “Thérapie. Taking Care of Colour in Hellenistic Greece.” In *Transformations. Classical Sculpture in Colour*, edited by Jan Stubbe Østergaard and Anne Marie Nielsen, 190–207. Copenhagen: Ny Carlsberg Glyptotek.
- Bourgeois, Brigitte and Jean-François de Lapérouse. 1992. “Conservation Report.” In *The Royal City of Susa. Ancient Near Eastern Treasures in the Louvre*, edited by Prudence O. Harper, Joan Aruz, and F. Tallon, 281–6. New York: Metropolitan Museum of Art.
- Bourgeois, Brigitte and Philippe Jockey. 2001. “Approches nouvelles de la polychromie des sculptures hellénistiques de Délos.” *Comptes rendus de l’Académie des Inscriptions et belles lettres* (January–March): 629–5.
2003. “Le geste et la couleur stratégies de mise en couleurs de la sculpture hellénistique de Délos.” *Bulletin archéologique du Comité des Travaux Historiques et Scientifiques* 30: 65–77.
2010. “The Polychromy of Hellenistic Marble Sculpture in Delos.” In *Circumlitio. The Polychromy of Antique and Medieval Sculpture*, edited by Vinzenz Brinkmann, Oliver Primavesi, and Max Hollein, 224–39. Munich: Hirmer Verlag.
- Bourgeois, Brigitte, Philippe Jockey, Hariclia Brekoulaki, and Andreas Karydas. 2007. “Le marbre, l’or et la couleur: nouveaux regards sur la polychromie de la sculpture hellénistique de Délos.” In *Peinture et couleur dans le monde grec antique. Actes de colloque, Musée du Louvre, 10 et 27 mars 2004*, edited by Sophie Descamps-Lequime, 163–91. Paris: Musée du Louvre.
- Bovon, Ann. 1963. “La représentation des guerriers perses et la notion de barbare dans la première moitié du Ve siècle.” *Bulletin de Correspondance Hellénique* 87: 579–602.
- Bracci, Susanna, Gianna Giachi, Paolo Liverani, Pasquino Pallecchi, and Fabrizio Paolucci, eds. 2018. *Polychromy in Ancient Sculpture and Architecture*. Livorno: Sillabe.
- Braenne, Jan. 2009. “Layers of Misunderstanding: The Challenge of Understanding, Interpreting and Organizing the Results from Architectural Paint Research.” In *Architectural Finishes in the Built Environment*, edited by Mary Jablonski and Catherine Matsen, 113–22. London: Archetype Publications.

- Bradley, Mark. 2009. *Colour and Meaning in Ancient Rome*. Cambridge: Cambridge University Press.
- Bräjer, Isabelle, ed. 2013. *Conservation in the Nineteenth Century*. London: Archetype Publications.
- Brandi, Cesare. 1963. *Teoria del restauro*. Rome: Edizioni di storia e letteratura.
- Bregnhøj, Line and Mads C. Christensen. 2009. "Paint Research, Interpretation and Communication." In *Architectural Finishes in the Built Environment*, edited by Mary Jablonski and Catherine Matsen, 87–96. London: Archetype Publications.
- Brekoulaki, Hariclia. 2000. "Sur la techné de la peinture grecque ancienne d'après les monuments funéraires de Macédoine." *Bulletin de Correspondance Hellénique* 124: 189–216.
- 2006a. "La peinture funéraire de Macédoine." In *Rois, cités, nécropoles: institutions, rites et monuments en Macédoine. Actes des colloques de Nanterre, décembre 2002 et d'Athènes, janvier 2004*, edited by Anne-Marie Guimier-Sorbets, Miltiade B. Hatzopoulos, and Yvette Morizot, 47–61. Paris: Diffusion de Boccard.
- 2006b. *La peinture funéraire de Macédoine. Emplois et fonctions de la couleur 4.–2. siècles avec bc.* 2 vols. Paris: Diffusion de Boccard.
2010. "A Scientific Investigation on the Painted Decoration of the Tomb of the Palmettes." In *Das Palmettengrab in Lefkadia*, edited by Katerina Rhomiopoulou and Barbara Schmidt-Dounas, 102–18. Mainz: Zabern.
2011. "Painting in the Macedonian Court." In *Heracles to Alexander the Great: Treasures from the Royal Capital of Macedon, A Hellenic Kingdom in the Age of Democracy*, edited by Angeliki Kottaridi and Susan Walker, 209–18. Oxford: Ashmolean Museum.
2014. "Precious Colours in Ancient Greek Painting and Polychromy: Material Aspects and Symbolic Values." *Révue Archéologique* 2014 (1): 1–36.
2015. "Greek Painting and the Challenge of Mimesis." In *A Companion to Ancient Aesthetics*, edited by Pierre Destrée and Penelope Murray, 218–36. Hoboken, NJ: Wiley.
2016. "Greek Interior Decoration: Materials and Technology in the Art of Cosmesis and Display." In *A Companion to Science, Technology, and Medicine in Ancient Greece and Rome*, edited by Georgia Irby, 672–92. Hoboken, NJ: Wiley.
2021. "Greek Painters' Techniques and Colors." In *The Painters of Pompeii: Roman Frescoes from the National Archaeological Museum of Naples*, edited by Mario Grimaldi, 32–5. Rome: MondoMostre.
- Brekoulaki, Hariclia, Sophia Sotiropoulou, Christos Katsifas, Andreas G. Karydas, and Vicky Kantarelou. 2014. "A Microcosm of Colour and Shine. The Polychromy of Chryselephantine Couches from Ancient Macedonia." *Techné* 40: 9–22.
- Brenner, Athalya. 1982. "Colour Terms in the Old Testament." *Journal for the Study of the Old Testament*, suppl. ser. 21.
1989. "Colours in the Bible." In *Encyclopedia of the Bible*, edited by Y. Hoffmann, 120–5 [in Hebrew]. Tel Aviv: Massada.
1999. "On Color and the Sacred in the Hebrew Bible." In *The Language of Color in the Mediterranean: An Anthology on Linguistic and Ethnographic Aspects of Color Terms*, edited by Alexander Borg, 200–7. Stockholm: Almqvist & Wiksell International.
- Briant, Pierre. 1988. "Le nomadisme du grand roi." *Iranica Antiqua* 23: 253–73.
2001. *Bulletin d'Histoire Achéménide II (1997–2000)*. Paris: Thotm.
2002. *From Cyrus to Alexander. A History of the Persian Empire*. Translated by P. T. Daniels. Winona Lake, IN: Eisenbrauns.
2013. "Susa and Elam in the Achaemenid Empire." In *The Palace of Darius at Susa: The Great Royal Residence of Achaemenid Persia*, edited by Jean Perrot, 3–48. London: I. B. Tauris.
2018. *From Cyrus to Seleukos. Studies in Achaemenid and Hellenistic History*. Irvine: University of California Irvine Jordan Center for Persian Studies.

2020. "The Discovery of Persepolis in the 18th Century: Accounts of Travelers and the 'érudits de cabinet.'" In *The Art of Empire in Achaemenid Persia: Studies in Honour of Margaret Cool Root*, Achaemenid History 16, edited by Elspeth Dusinberre, Mark Garrison, and Wouter F. Henkelman, 5–39. Leiden: Netherlands Institute for the Near East.
2019. "Peut-on parler d'art perse? Les interprétations de Georges Perrot et Charles Chipiez (1890) dans le contexte de leur élaboration." In *Das Weltreich der Perser Rezeption – Aneignung – Verargumentierung*, edited by Kai Ruffing, Robert Rollinger, Louise Thomas, 67–80. Wiesbaden: Harrassowitz.
- Briant, Pierre and Rémy Bouchard, eds. 2005. *L'archéologie de l'empire achéménide: Nouvelles recherches. Actes du colloque organisé au Collège de France par le Réseau international d'études et de recherches achéménides*, 21–23 novembre 2003. Persika 6. Paris: De Boccard.
- Briant, Pierre, Wouter F. Henkelman, and Matthew W. Stolper, eds. 2008. *L'archive des fortifications de Persépolis. État des questions et perspectives de recherches. Actes du colloque organisé au Collège de France*, 3–4 novembre 2006. Persika 12. Paris: De Boccard.
- Briant, Pierre and Francis Joannès, eds. 2006. *La transition entre l'empire achéménide et les royaumes hellénistiques*. Persika 9. Paris: De Boccard.
- Brinkmann, Vinzenz. 2003. *Die Polychromie der archaischen und frühklassischen Skulptur*. Munich: Biering & Brinkmann.
2007. "The Blue Eyes of the Persians: The Colored Sculpture of the Time of Alexander and the Hellenistic Period." In *Bunte Götter: Die Farbigkeit antiker Skulptur. Eine Ausstellung der Staatlichen Antikensammlungen und Glyptothek München*, 16. Dezember 2003 bis 29. Februar 2004, 15. Juni–5. September 2004, edited by Vinzenz Brinkmann and Raimund Wünsche, 150–67. Munich: Staatliche Antikensammlungen und Glyptothek.
- ed. 2008. *Bunte Götter: Die Farbigkeit antiker Skulptur. Eine Ausstellung der Liebieghaus Skulpturensammlung, Frankfurt am Main in Kooperation mit der Stiftung Archäologie, München*, 8. Oktober 2008–15. Februar 2009. Frankfurt: Liebieghaus Skulpturensammlung.
- Brinkmann, Vinzenz. 2015. "The Life of Ancient Statues." In *Defining Beauty: The Body in Ancient Greek Art*, edited by Ian Jenkins, 30–9. London: British Museum.
- Brinkmann, Vinzenz, Renée Dreyfus, and Ulrike Koch-Brinkmann, eds. 2017. *Gods in Color. Polychromy in the Ancient World*. Munich: Prestel; San Francisco: Fine Arts Museums of San Francisco.
- Brinkmann, Vinzenz and Ulrike Koch-Brinkmann, eds. 2020. "'Mehr Glanz' Die Rolle des Goldes in der griechischen und römischen Statuenpolychromie." In *Bunte Götter. Die Farben der Antike*, golden ed., 128–35. Munich: Prestel.
- Brinkmann, Vinzenz and Raimund Wünsche, eds. 2004. *Bunte Götter: Die Farbigkeit antiker Skulptur. Eine Ausstellung der Staatlichen Antikensammlungen und Glyptothek München*, 16. Dezember 2003 bis 29. Februar 2004, 15. Juni–5. September 2004. Munich: Staatliche Antikensammlungen und Glyptothek.
- eds. 2007. *Color of Gods: Painted Sculpture of Classical Antiquity*. Munich: Prestel.
- Brodrick, Anne. 1993. "Painting Techniques of Early Medieval Sculpture." In *Romanesque Sculpture from Medieval England*, edited by Christopher Norton, Ben Heywood, Alan Bowness, and Robert Hopper, 18–27. Leeds: Henry Moore Institute.
2001. "Medieval Painterly Techniques on Monuments." In *Monuments. Proceedings of the Joint Forum for Conservation Issues*, 15–21. London: n.p.
- Bronk, Heike, Stefan Röhrs, Alexej Bjeoumikhov, Norbert Langhoff, Jürgen Schmalz, Reiner Wedell, Hans-Eberhard Gorny, Andreas Herold, and Ulrich Waldschläger. 2001. "ArtTAX®: A New Mobile Spectrometer for Energy Dispersive Micro X-Ray Fluorescence Spectrometry on Art and Archaeological Objects." *Fresenius Journal of Analytical Chemistry* 371: 307–16.

- Brøns, Cecilie. 2017. "Sacred Colours. Purple in Greek Sanctuaries in the Second Half of the 1st Millennium BC." In *Treasures from the Sea*, edited by Francesco Meo and Hedvig Landenius Enegren, 109–17. Oxford: Oxbow Books.
- "Reconstructing Ancient Polychromy: The Beauty of Palmyra." *Journal of Eastern Mediterranean Archaeological Heritage Studies* 8: 141–58.
- Brøns, Cecilie, Kaare Lund Rasmussen, Anna Lluveras, Marta Melchiorre di Crescenzo, and Rebecca Stacey. 2018. "Painting the Palace of Apries I: Binding Media and Coatings." *Heritage Science* 6 (6). <https://doi.org/10.1186/s40494-018-0170-9>
- Brøns, Cecilie, Jens Stenger, Jørn Bredal-Jørgensen, Fabiana Di Gianvincenzo, and Luise Ørsted Brandt. 2022. "Palmyrene Polychromy: Investigations of Funerary Portraits from Palmyra in the Collections of the Ny Carlsberg Glyptotek, Copenhagen." In "Polychromy in Ancient Sculpture and Architecture," special issue, edited by Joanne Dyer. *Heritage* 5 (2): 1199–1239.
- Brooks, Alison, John Yellen, Richard Potts, Anna K. Behrensmeyer, Alan L. Deino, David E. Leslie, Stanley H. Ambrose, Jeffrey R. Ferguson, Francesco d'Errico, Andrew M. Zipkin, Scott Whittaker, Jeffrey Post, Elizabeth G. Veatch, Kimberly Foecke, and Jennifer B. Clark. 2018. "Long-Distance Stone Transport and Pigment Use in the Earliest Middle Stone Age." *Science* 360, 90–4.
- Brosius, Maria. 1998. *Women in Ancient Persia, 559–331 bc*. Oxford: Clarendon Press.
- 2007. "New out of Old: Court and Court Ceremony in Achaemenid Persia." In *The Court and Court Society in Ancient Monarchies*, edited by Anthony Spawforth, 17–57. Cambridge: Cambridge University Press.
- 2021. *A History of Ancient Persia: The Achaemenid Empire*. Hoboken, NJ: Wiley.
- Brown, Brian and Marian Feldman, eds. 2014. *Critical Approaches to Ancient Near Eastern Art*. Boston: De Gruyter.
- Bruijn, Cornelis De. 1720. *Travels into Muscovy, Persia, and Part of the East-Indies*. London: A. Bettesworth.
- Brunn, Heinrich. 1887. *Beschreibung der Glyptothek König Ludwig's I. zu München*. 5th ed. Munich: Buchholz.
- Bruquetas Galán, Rocío. 2008. "La obtención de pigmentos azules para las obras de Filipe II: Comercio europeo y Americano." In *2nd International Symposium Art Technological Source Research: Towards a New Discipline*, 55–63. Madrid: Universidad Complutense de Madrid, Museo Nacional Reina Sofía.
- Bryan, Betsy. 2001. "Painting Techniques and Artisan Organization in the Tomb of Suemniwet, Theban Tomb 92." In *Colour and Painting in Ancient Egypt*, edited by Vivian W. Davies, 63–72. London: British Museum Press.
- 2010. "Pharaonic Painting through the New Kingdom." In *Companion to Ancient Egypt*, edited by Alan B. Lloyd, 990–1007. Chichester: Wiley-Blackwell.
- 2018. "The ABC's of Painting in the Mid-Eighteenth Dynasty Terminology and Social Meaning." In *Essays for the Library of Seshat. Studies Presented to Janet Johnson on the Occasion of Her 70th Birthday*, edited by Robert Ritner, 1–29. Chicago: The Oriental Institute.
- Buckingham, James. 1829. *Travels in Assyria, Media and Persia, Including a Journey from Bagdad by Mount Zagros ...* Vol. 1. London: Colburn.
- Buisson, Nathalie, Delphine Burlot, Helene Eristov, Myriam Eveno, and N. Sarkis. 2015. "The Tomb of the Three Brothers in Palmyra: The Use of Mimetite, a Rare Yellow Pigment, in a Rich Decoration." *Archaeometry* 57 (6): 1025–44.
- Burchardt, Max. 1911. "Datierte Denkmäler der Berliner Sammlung aus der Achämenidenzeit." *Zeitschrift für Ägyptische Sprache und Altertumskunde* 49: 69–80.
- Burford, Alison. 1972. *Craftsmen in Greek and Roman Society*. London: Thames & Hudson.

- Burnett Grossman, Janet, Jerry Podany, and Marion True, eds. 2003. *History of Restoration of Ancient Stone Sculptures*. Los Angeles: J. Paul Getty Museum.
- Burnouf, E. 1847. "Le Parthenon." *Revue des deux mondes* 20: 835–53.
- Bush, Olga. 2009. "The Writing on the Wall. Reading the Decoration of the Alhambra." *Muqarnas* 26: 119–48.
2011. "Designs Always Polychromed or Gilded. The Aesthetics of Color in the Alhambra." In *And Diverse Are Their Hues. Color in Islamic Art and Culture*, edited by Jonathan Bloom and Sheila Blair, 52–75. New Haven, CT: Yale University Press.
2021. "Color and Geometry in the Alhambra and What Got Lost in the Alhambresque." In "Geometry and Color. Decoding the Arts of Islam in the West from the Mid-19th to the Early 20th Century" (special volume), edited by Sandra Gianfreda, Francine Giese, Axel Langer and Ariane Varela Braga. *Manazir Journal* 3: 13–29.
- Cage, John. 1993. *Color and Culture: Practice and Meaning from Antiquity to Abstraction*. Boston: Little, Brown and Co.
- Cahill, Nicholas. 1985. "The Treasury at Persepolis: Gift-Giving at the City of the Persians." *American Journal of Archaeology* 89: 373–89.
- Caley, Earle. 1946. "Ancient Greek Pigments." *Journal of Chemical Education* 23: 314–6.
- Callieri, Pierfrancesco. 2003. "Some Notes on the So-Called Temple of the Fratarakas at Persepolis." In *Studi in onore di Umberto Scerrato per il suo settantacinquesimo compleanno*, edited by Maria Fontana and Bruno Genito, 153–65. Naples: Università di Napoli "L'Orientale."
- Calmeyer, Peter. 1976 and 1984. "Persönliche Krone und Diadem." *Archäologische Mitteilungen aus Iran* n.s. 9: 45–95; 10: 191–5.
1980. "Textual Sources for the Interpretation of Achaemenian Palace Decorations." *Iran* 18: 55–63.
1981. "Figürliche Fragmente aus Pasargadae nach Zeichnungen E. Herzfelds." *Archäologische Mitteilungen aus Iran* n.s. 14: 27–44.
1989. "Zur Genese altiranischer Motive: Die elamisch-persische Tracht." *Archäologische Mitteilungen aus Iran* n.s. 21: 27–53.
1990. "Das Persepolis der Spätzeit." In *Centre and Periphery. Proceedings of the Groningen 1986 Achaemenid History Workshop*, edited by Heleen Sancisi-Weerdenburg and Amélie Kuhrt, 7–36. Leiden: Netherlands Institute for the Near East.
1991. "Die blauen Schuhe." *Archäologische Mitteilungen aus Iran* n.s. 24: 133.
2009. *Die Reliefs der Gräber V und VI in Persepolis*. Mainz: Zabern.
- Cameron, George. 1948. *Persepolis Treasury Tablets*. Oriental Institute Publications 65. Chicago: The Oriental Institute.
1958. "Persepolis Treasury Tablets Old and New." *Journal of Near Eastern Studies* 17: 161–76.
- Cameron, George and Ilya Gershevitch. 1965. "New Tablets from the Persepolis Treasury." *Journal of Near Eastern Studies* 24, Erich F. Schmidt Memorial Issue: 167–92.
- Canby, Sheila, ed. 2009. *Shah Abbas: The Remaking of Iran*. London: British Museum Press.
- Canepa, Matthew. 2021. "Sculpting in Time: Rock Reliefs, Inscriptions and the Transformation of Iranian Memory and Identity." In *Afterlives of Ancient Rock-Cut Monuments in the Near East*, edited by Jonathan Ben-Dov and Felipe Rojas, 221–71. Leiden: Brill.
- Carras, Costa. 1972. "Some Problems Relating to Conservation in Greece." *Art and Archaeology Research Papers* 1: 62–6.
- Carriveau, Gary and Diana Omecinsky. 1983. "Identification of the Forbes Collection Pigments: 1. Whites." *Journal of the American Institute for Conservation* 22 (2): 68–81.
- Carswell, John. 1972. "East and West: A Study in Aesthetic Contrasts (Part I): Sir Thomas Herbert and His Travel Writings." *Art and Archaeology Research Papers* 2: 71–87.

- Cartledge, Paul and Fiona Rose Greenland, eds. 2010. *Responses to Oliver Stone's Alexander: Film, History, and Cultural Studies*. Madison: University of Wisconsin Press.
- Casanova, Michèle. 2002. "Lapis-lazuli, joyau de l'orient ancien." In *Matériaux, productions, circulations du néolithique à l'âge du bronze*, edited by Jean Guaine, 169–90. Paris: Errance.
- Caubet, Annie. 1997. "Susa: From Site to Museum." In *Virtual Archaeology: Recreating Ancient Worlds*, edited by Maurizio Forte and Alberto Siliotti, 98–101. New York: Abrams.
- ed. 1999. *Cornaline et pierres précieuses: La Méditerranée de l'antiquité à l'Islam*. Paris: Musée du Louvre.
2013. "The Fired Arts." In *The Palace of Darius at Susa: the great royal residence of Achaemenid Persia*, edited by Jean Perrot, 300–4. London: I. B. Tauris.
2021. "Revoir le décor de briques glacées du palais de Darius à Suse." In *Dans les pas d'Imhotep. Mélanges offerts à Audran Labrousse*, edited by Rémi Legros, 235–8. Leuven: Peeters.
- Caubet, Annie and Anne Bouquillon. 2007. *Faïences et matières vitreuses de l'Orient ancien: études physico-chimique et catalogue des œuvres du Département des antiquités orientales*. Paris: Musée du Louvre.
- Caubet, Annie and Alexander Kaczmaryk. 1998. "Les briques glacées du palais de Darius." *Techné* no. 7: 23–6.
- Cavassa, Laetitia. 2018. "La production de bleu égyptien durant l'époque hellénistique et l'Empire romain (III^e c. av. J.–C.–I^{er} s. après J.–C.)." In *Les arts de la couleur en Grèce ancienne ... et ailleurs. Proceedings from a Conference held at Athens, April 2009*, edited by Philippe Jockey, 13–34. Athens: École française d'Athènes.
- Chaptal, J. 1809. "Sur quelques couleurs trouvées à Pompéi." *Annales de Chimie* 70: 22–31.
- Chardin, Jean. 1711. *Voyage de Paris à Ispahan*. 10 vols. Amsterdam: Chez Jean Louis de Lorme. (for a new edition see www.achemenet.com/dotAsset/dbc2e4b6-5b2e-473f-9bb5-438b2b6dd76e.pdf)
- Cheal, Cathryn. 2004. "The Meaning of Color: Skin Color in Eighteenth Dynasty Egypt." In *Race and Identity in the Nile Valley: Ancient and Modern Perspectives*, edited by Carolyn Fluehr-Lobban and Kharyssa Rhodes, 47–69. Trenton, NJ: Red Sea Press.
- Chelkowski, Peter and Hamid Dabashi. 1999. *Staging a Revolution: The Art of Persuasion in the Islamic Republic of Iran*. New York: New York University Press.
- Chevalier, Nicole, ed. 1997. *Une Mission en Perse 1897–1912*. Paris: Réunion des musées nationaux.
2010. "Les découvreurs du palais de Suse." In *Le palais de Darius à Suse: une résidence royale sur la route de Persépolis à Babylone*, edited by Jean Perrot, 74–115. Paris: PUPS.
2013. "The Discoverers of the Palace of Susa." In *The Palace of Darius at Susa: The Great Royal Residence of Achaemenid Persia*, edited by Jean Perrot, 53–96. London: I. B. Tauris.
2016. "Paul-Émile Botta et Eugène Flandin à Khorsabad: un consul et un peintre archéologues." In *Mille et une empreintes. Un Alsacien en Orient. Mélanges en l'honneur du 65^e anniversaire de Dominique Beyer*, edited by Julie Patrier, Philippe Quenet, and Pascal Butterlin, 99–108. Turnhout: Brepols.
2018. "Lottin de Laval en Orient: la découverte de la lottinoplastique." In *Implementing Meanings: The Power of the Copy Between Past, Present and Future. An Overview from the Ancient Near East*, edited by Silvana Di Paolo, 209–24. Münster: Ugarit-Verlag.
- Chevalier, Nicole, 2020. "Du chantier au musée: l'impact des découvertes des fouilles Dieulafoy à Suse dans l'opinion publique française à la fin du XIX^e siècle." *ARTA* 2020 (4).
- Clarke, Mark. 2001. *The Art of All Colours: Medieval Recipe Books for Painters and Illuminators*. London: Archetype Publications.

- Cleland, Liza and Karen Stears, eds. 2004. *Colour in the Ancient Mediterranean World*. Oxford: Hedges.
- Cohen, Ada. 1997. *The Alexander Mosaic: Stories of Victory and Defeat*. Cambridge: Cambridge University Press.
- Cohen, Ada and Stephen Kangas, eds. 2010. *Assyrian Reliefs from the Palace of Ashurnasirpal II: A Cultural Biography*. Hanover, NH: University Press of New England.
- Cohen, Beth, ed. 2000. *Not the Classical Ideal: Athens and the Construction of the Other in Greek Art*. Leiden: Brill.
- Colalucci, Gianluigi. 2016. *Michelangelo and I*. Rome: Ore Cultura Srl.
- Cole, J. W. 1859. *The Life and Theatrical Times of Charles Kean*. London: Richard Bentley.
- Colinart, Sylvie and Michel Menu, eds. 1998. *La couleur dans la peinture et l'émaillage de l'Égypte ancienne*. Bari: Edipuglia.
- Colinart, Sylvie and Sandrine Pagès-Camagna. 2001. "Egyptian Polychromy: Pigments of the Pharaonic Palette." In *The Polychromy of Antique Sculptures and the Terracotta Army of the First Chinese Emperor*, edited by Wu Yongqi, Zhang Tinghao, Michael Petzet, Erwin Emmerling, and Catharina Blänsdorf, 85–8. Munich: Bayerisches Landesamt für Denkmalpflege.
- Collignon, Maxime. 1898. *La polychromie dans la sculpture grecque*. Paris: Leroux.
- Collins, Paul. 2008. *Assyrian Palace Sculptures*. London: British Museum Press.
2020. "Casting the Ruins: Creating Assyria through Plaster and Paint." In *In Context. The Reade Festschrift*, edited by Irving Finkel and St. John Simpson, 304–17. Oxford: Archaeopress.
- Collon, Dominique. 1995. *Ancient Near Eastern Art*. Berkeley: University of California Press.
- Connor, Peter. 1989. "Cast-Collecting in the Nineteenth Century: Scholarship, Aesthetics, Connoisseurship." In *Rediscovering Hellenism: The Hellenic Inheritance and the English Imagination*, edited by Graeme Wilber Clarke, 187–235. Cambridge: Cambridge University Press.
- Conti, Alessandro. 2007. *History of the Restoration and Conservation of Works of Art*. Translated by H. Glanville. London: Taylor and Francis.
- Cook, Brian, Bernard Ashmole, and Donald Strong. 2005. *Relief Sculpture of the Mausoleum at Halicarnassus*. Oxford: Oxford University Press.
- Cooksey, Christopher. 1994. "Making Tyrian Purple." *Dyes in History and Archaeology* 13: 7–13.
- Corbin, Henry. 1974. "Réalisme et symbolisme des couleurs en cosmologie shiite." In *The Realms of Color*, edited by Adolf Portman and Rudolf Ritsema, 109–76. Leiden: Brill.
- Cotty, Marianne. 2018. "Between Orientalism and Persomania. The Presentation of the Iranian Collections at the Louvre." In *The Elamite World*, edited by Javier Álvarez-Mon, Gian Pietro Basello, and Yasmina Wicks. London: Thames & Hudson.
- Crinson, Mark. 1996. *Empire Building: Orientalism and Victorian Architecture*. London: Routledge.
- Cronyn, Janet Margaret. 1990. *The Elements of Archaeological Conservation*. London: Routledge.
- Crüsemann, Nicola. 2001. *Vom Zweistromland zum Kupfergraben: Vorgeschichte und Entstehungsjahre (1899–1918) der Vorderasiatischen Abteilung der Berliner Museen vor fach- und kulturpolitischen Hintergründen*. Berlin: Mann.
- Çubukçu, Ayça. 2018. *For the Love of Humanity. The World Tribunal on Iraq*. Philadelphia: University of Pennsylvania Press.
- Cuomo, Serafina. 2007. *Technology and Culture in Greek and Roman Antiquity*. Cambridge: Cambridge University Press.
- Curl, James. 2005. *The Egyptian Revival: Ancient Egypt as the Inspiration for Design Motifs in the West*. London: Routledge.
- Curtis, John, ed. 1997. *Mesopotamia and Iran in the Persian Period: Conquest and Imperialism 539–331 bc*. London: British Museum Press.
1998. "A Chariot Scene from Persepolis." *Iran* 36: 45–9.
2000. *Ancient Persia*. 2nd ed. London: British Museum Press.

2005. "Greek Influences on Achaemenid Art and Architecture." In *The Greeks in the East*, edited by Alexandra Villing, 115–23. London: British Museum.
2011. "The Present Condition of Babylon." In *Babylon. Wissenskultur in Orient und Okzident*, edited by Eva Cancik-Kirschbaum, Margarete van Ess, and Joachim Marzahn, 3–18. Berlin: De Gruyter.
- Curtis, John, Heather McCall, Dominique Collon, and Laila al-Gailani Werr, eds. 2008. *New Light on Nimrud: Proceedings of the Nimrud Conference 11th–13th March 2002*. London: British Institute for the Study of Iraq.
- Curtis, John and Shahrokh Razmjou. 2005. "The Palace." In *Forgotten Empire. The World of Ancient Persia*, edited by John Curtis and Nigel Tallis, 50–103. Berkeley: University of California Press.
- Curtis, John and St John Simpson, eds. 2010. *The World of Achaemenid Persia*. London: I. B. Tauris.
- Curtis, John and Nigel Tallis, eds. 2005. *Forgotten Empire. The World of Ancient Persia*. Berkeley: University of California Press.
- Curzon, George N. 1892. *Persia and the Persian Question*. 2 vols. London: Longmans, Green and Co.
- Dadashzadeh, Maral, Mahnaz Gorji, and Reza Vahidzadeh. 2017. "Egyptian Blue or Lapis Lazuli Paste: Structural Study and Identification of the Collection of Objects Nominate Lapis Lazuli Paste in the National Museum of Iran." [in Persian] *Journal of Research on Archaeology* 2 (2): 35–9.
- Daniels, Vincent. 1987. "The Blackening of Vermilion by Light." In *Recent Advances in the Conservation and Analysis of Artifacts: Jubilee Conservation Conference Papers*, edited by James Black, 280–2. London: Summer Schools Press.
- Daryaee, Touraj, ed. 2012. *The Oxford Handbook of Iranian History*. New York: Oxford University Press.
- Daryaee, Touraj, Ali Mousavi, and Khodadad Rezakhani, eds. 2014. *Excavating an Empire: Achaemenid Persia in Longue Duree*. Costa Mesa, CA: Mazda Publishers.
- Daucé, Noëmi. 2013. "The Ornamental Bricks." In *The Palace of Darius at Susa: the great royal residence of Achaemenid Persia*, edited by Jean Perrot, 305–20. London: I. B. Tauris.
- Daulier-Deslandes, André. 1673. *Les beautés de la Perse*. Paris: G. Clouzier.
- Davies, Vivian W., ed. 2001. *Colour and Painting in Ancient Egypt*. London: British Museum Press.
- Dawson, Julie, Christina Rozeik, and Margot M. Wright, eds. 2010. *Decorated Surfaces on Ancient Egyptian Objects: Technology, Deterioration and Conservation*. London: Archetype Publications.
- Day, Jo, ed. 2013. *Making Senses of the Past: Toward a Sensory Archaeology*. Carbondale, IL: Southern Illinois University Press.
- Delamare, François. 2013. *Blue Pigments: 5000 Years of Art and Industry*. London: Archetype Publications.
- DeLaine, Janet. 2021. "Production, Transport and On-Site Organisation of Roman Mortars and Plasters." *Archaeological and Anthropological Sciences* 13, 195. <https://doi.org/10.1007/s12520-021-01401-5>
- Delshad, Soheil and M. Doroodi. 2019. "DNF: A New Inscription Emerges from the Shadow." *ARTA* 2019 (1): 1–18.
- Demange, F. 2007. *Glass, Gilding and Grand Design: Art of Sasanian Persia (224–642)*. New York: Asia Society.
- Dentzer-Feydy, Jacqueline, Anne-Marie Guimier-Sorbets, and Christiane Delplace, eds. 2019. *Stucs d'Orient. Traditions orientales et cultures hellénisées*. Beirut: Presses de l'Ifpo.
- Descat, Raymond, ed. 1989. "L'or perse et l'histoire grecque. Actes de la Table ronde CNRS, Bordeaux, 20–22 Mars 1989." *Revue des Études anciennes* 91 (1–2).
- de Destefani, Lucila R. Geymonat and T. Allan Whitfield. 2008. "Esthetic Decision-Making: How Do People Select Colours for Real Settings?" *Colour Research and Application* 33: 55–60.
- Destrée, Pierre and Penelope Murray, eds. 2015. *A Companion to Ancient Aesthetics*. Hoboken, NJ: Wiley.

- Deuber-Pauli, Erica and Théo-Antoine Hermanès. 1981. "Le Portail peint de la cathédrale Lausanne: Histoire, Iconographie, Sculpture et Polychromie." *Nos Monuments d'Art et d'Histoire* 33: 262–74.
- Devetzi, Anastasia. 2010. "Behind the Art. Pigments at Akrotiri, Thera." *ALS. Periodical of the Society for the Promotion of Studies on Prehistoric Thera* 7: 30–74.
- Diba, Layla S. 2006. "An Encounter between Qajar Iran and the West: The Rashtrapati Bhavan Painting of Fath 'Ali Shah at the Hunt." In *Islamic Art in the 19th Century: Tradition, Innovation, and Eclecticism*, edited by Doris Behrens-Abouseif and Stephen Vernoit, 281–304. Leiden: Brill.
- Diderot, Denis and Jean Le Rond D'Alembert, eds. 1751–72. *Encyclopédie ou Dictionnaire raisonné des sciences, des arts et des métiers, par une Société de Gens de lettres*. Paris.
- Dieulafoy, Jane. 1888. *À Suse, journal des fouilles 1884–1886*. Paris: Librairie Hachette et Cie.
1890. *At Susa, the Ancient Capital of the Kings of Persia. Narrative of Travel through Western Persia and Excavations Made at the Site of the Lost City of the Lilies, 1884–1886*. Philadelphia: Gebbie & Co.
1902. *Théâtre en plein air des arènes de Béziers. Dimanche 17 et Mardi 19 août 1902 ... Parysatis, drame lyrique en 3 actes et 1 prologue, paroles de Mme Jane Dieulafoy, musique de M. Camille Saint-Saëns. Album officiel*. Béziers: Ville de Béziers.
- Dieulafoy, Marcel. 1884–9. *L'art antique de la Perse*. Paris: Librairie centrale d'architecture.
1885. "Mission de Susiane. Note relative à la découverte sur le tombeau de Darius de sept inscriptions nouvelles." *Revue Archéologique* ser. 3 (6): 224–7.
- 1890–3. *L'acropole de Suse*. Paris: Hachette.
- Dimitriou, Penelope. 1951. "The Polychromy of Greek Sculpture." PhD diss., Columbia University.
- Diodorus of Sicily. 1963. *History*. Vol. 8. With an English Translation by C. Bradford Welles. Cambridge, MA : Harvard University Press and W. Heinemann.
- Dirschedl, Uta. 2013. *Die griechischen Säulenbasen*. Wiesbaden: Reichert.
- Dirven, Lucinda. 2005. "Semeion. Smy. Signum. A Note on the Romanization of the Semitic Cultic Standard." *Parthica* 7: 119–36.
2009. "Hatra, un exemple exceptionnel de l'art parthe." *Dossiers d'archéologie* 334 (July–August): 46–55.
- Doehne, Eric and Clifford Price, eds. 2010. *Stone Conservation: An Overview of Current Research*. 2nd ed. Los Angeles: Getty Conservation Institute.
- Domasłowski, Wiesław. 2008. *Preventive Conservation of Stone Historical Objects*. Toruń: Uniwersytetu Mikołaja Kopernika.
- Donaldson, T. 1851. "Polychromatic Embellishments in Greek Architecture. Paper Read at the Royal Institute of British Architects, Jan. 12." *The Civil Engineer and Architects Journal* 14: 42–50.
- Donati, Fulvia. 1999. *La Gipsoteca di arte antica*. Pisa: University of Pisa.
- Downey, Susan. 1977. *The Stone and Plaster Sculpture. Excavations at Dura Europos Conducted by Yale University and the French Academy of Inscriptions and Letters 1.2*. Los Angeles: Institute of Archaeology, University of California.
- Drenkhahn, Rosemarie. 1995. "Artisans and Artists in Pharaonic Egypt." In *Civilizations of the Ancient Near East*, edited by Jack Sasson, John Baines, Gary Beckman, and Karen S. Rubinson, 331–43. New York: Scribner.
- Drijvers, Jan Willem. 1991. "Cornelis De Bruijn and Gijsbert Cuper. A Skilled Artist and a Learned Discussion." In *Through Travellers' Eyes: European Travellers on the Iranian Monuments*, edited by Heleen Sancisi-Weerdenburg, and Jan W. Drijvers, 89–107. Leiden: Nederlands Instituut voor het Nabije Oosten.
1993. "Persepolis as Perceived by Engelbert Kaempfer and Cornelis De Bruijn." In *Engelbert Kaempfer: Werk und Wirkung*, edited by Detlef Haberland, 85–104. Stuttgart: F. Steiner.

- Drost, Wolfgang. 1996. "Colour, Sculpture, Mimesis. A 19th Century Debate." In *The Colour of Sculpture 1840–1910*, edited by Andreas Blühm and Wolfgang Drost. Zwolle: Waanders.
- Duman, Nicholas. 2006. "Limestone." In *Stone Conservation: Principles and Practice*, edited by Alison Henry, 161–90. Shaftesbury: Donhead.
- Dusinberre, Elspeth R. M. 2005. "Herzfeld in Persepolis." In *Ernst Herzfeld and the Development of Near Eastern Studies, 1900–1950*, edited by Ann Gunter and Stefan Hauser, 137–80. Leiden: Brill.
- Dusinberre, Elspeth, Mark Garrison, and Wouter F. Henkelman, eds. 2020. *The Art of Empire in Achaemenid Persia: Studies in Honour of Margaret Cool Root*. Achaemenid History 16. Leiden: Netherlands Institute for the Near East.
- Eibner, Alexander. 1911. "Über die Lichtwirkungen auf Malerei-Farbstoffe." *Chemiker Zeitung* 35: 753–5, 774–6, 786–8.
- Ekhtiar, Maryam. 1998. "From Workshop and Bazaar to Academy. Art Training and Production in Qajar Iran." In *Royal Persian Paintings: The Qajar Epoch, 1785–1925*, edited by Layla S. Diba and Maryam Ekhtiar, 50–65. London: I. B. Tauris.
- El Goresy, Ahmed, Heiner Jacksch, Abdel Razek, and Karl Ludwig Weiner. 1986. *Ancient Pigments in Wall Paintings of Egyptian Tombs and Temples. An Archaeometric Project*. Heidelberg: Max-Planck-Institut für Kernphysik.
- Elley, Derek. 1984. *The Epic Film: Myth and History*. London: Routledge.
- Emami, Mohammadamin. 2005. *Recent Investigations into the Archaeometallurgy and Ancient Mining of the Achaemenid Period in Takht-i-Djamshid, Shiraz*. Report for the Parsa-Pasargadae Foundation [in Persian].
2010. "Preliminary Studies on Mining Methods Used in Sivand Quarries During the Achaemenian Period in Fars Province, Iran." *Geologia Colombiana* 35: 175–85.
- Emami, Mohammadamin, Moein Eslami, Hamid Fadaei, Hamid Karami, and K. Ahmadi. 2018. "Mineralogical–Geochemical Characterization and Provenance of the Stones Used at the Pasargadae Complex in Iran: A New Perspective." *Archaeometry* 160 (6): 1184–200.
- Engelhart, Helmut and Gerda Kempter, eds. 1982. *Diversarum artium studia. Beiträge zu Kunstwissenschaft, Kunsttechnologie und ihren Randgebieten: Festschrift für Heinz Roosen-Runge zum 70. Geburtstag am 5. Oktober 1982*. Wiesbaden: Reichert.
- Englund, Klaudia. 2003. *Nimrud und seine Funde: Der Weg der Reliefs in die Museen und Sammlungen*. Rahden: Verlag Marie Leidorf.
- Eremin, Katherine and Narayan Khandekar. 2008. "Identification of Pigments on the Persepolis Relief: 1943.1062." Unpublished report, Harvard Strauss Center for Conservation and Technical Studies.
- Errington, Elizabeth and Vesta Sarkosh Curtis, eds. 2007. *From Persepolis to the Punjab. Exploring Ancient Iran, Afghanistan and Pakistan*. London: British Museum Press.
- Ettinghausen, Elizabeth. 2005. "Ernst Herzfeld: Reminiscences and Revelations." In *Ernst Herzfeld and the Development of Near Eastern Studies, 1900–1950*, edited by Ann Gunter and Stefan Hauser, 583–615. Leiden and Boston: Brill.
- Evans, Jean. 2012. *The Lives of Sumerian Sculpture: An Archaeology of the Early Dynastic Temple*. Cambridge: Cambridge University Press.
- Fant, J. Clayton. 1988. "The Roman Emperors in the Marble Business: Capitalists, Middle-Men, or Philanthropists?" In *Classical Marble. Geochemistry, Technology, Trade*, edited by Marc Waelkens and Norman Herz, 147–58. Boston: Kluwer.
- Farkas, Ann. 1974. *Achaemenid Sculpture*. Istanbul: Nederlands Historisch-Archaeologisch Instituut in het Nabije Oosten.
- Fassina, Vasco, ed. 2000. *Proceedings of the 9th International Congress on Deterioration and Conservation of Stone*. 2 vols. Amsterdam: Elsevier.

- Fellinger, Gwenaëlle, Carol Guillaume, and Melanie Gibson, eds. 2021. *Revealing the Unseen: New Perspectives on Qajar Art*. London: Gingko.
- Fergusson, James. 1851. *The Palaces of Nineveh and Persepolis Restored*. London: Murray.
1855. "A Letter to the Public." *The Athenaeum* May 5, 1855.
- Ferrier, Ronald. 1977. "The First English Guidebook to Persia: A Description of the Persian Monarchy." *Iran* 15: 75–88.
- ed. 1996. *A Journey to Persia: Jean Chardin's Portrait of a Seventeenth Century Empire*. London: St. Martin's Press.
- Fincham, Derek. 2007. "Rejecting Renvoi for Movable Cultural Property: The Islamic Republic of Iran vs. Denyse Berend," *International Journal of Cultural Property* 14: 111–20.
- Finlay, Victoria, Pascale Georgiev, Narayan Khandekar, and Kingston Trinder. 2018. *An Atlas of Rare and Familiar Colour: The Harvard Art Museum's Forbes Pigment Collection*. Los Angeles: Atelier Éditions.
- Fisch, Solomon. 1985. *Ezekiel*. Hebrew text and English translation with an introduction and commentary. 10th ed. London: Soncino Press.
- Fischer-Hansen, Tobias. 2000. "Ergasteria in the Western Greek world." In *Polis and Politics: Studies in Ancient Greek History Presented to Mogens Herman Hansen*, edited by Pernille Flensted-Jensen, Thomas H. Nielsen, and Lene Rubinstein, 91–120. Copenhagen: Museum Tusculanum Press.
- Flandin, Eugène. 1845. "Voyage archéologique à Ninive, 2." *Revue des Deux Mondes* 11: 88–111.
1851. *Voyage en Perse de mm. Eugène Flandin, peintre, et Pascal Coste, architecte ... entrepris par ordre de M. le ministre des affaires étrangères, d'après les instructions dressées par l'Institut*. 2 vols. Publié sous les auspices de M. le ministre de l'intérieur. Paris: Gide et J. Baudry.
- Floor, Willem. 1999. "Art (Naqqashi) and Artists (Naqqashan) in Qajar Persia." *Muqarnas* 16: 125–54.
2005. *Wall Paintings and Other Figurative Mural Art in Qajar Iran*. Costa Mesa, CA: Mazda Publications.
- Fontan, Elizabeth. 1994. "Lottin de Laval (1810–1903): L'inventeur de la lottinoplastie qui se voulait orientaliste." In *De Khorsabad à Paris: La découverte des Assyriens. Notes et documents des musées de France*, edited by Elizabeth Fontan, 176–83. Paris: Réunion des musées nationaux.
1998. "Lottin de Laval et la Lottinoplastie." In *Regards sur la Perse antique à l'occasion des expositions à l'Église Saint-Cyran du Blanc (Indre) et au Musée d'Argentomagus*, 228–30. Le Blanc, Saint-Marcel: Amis de la Bibliothèque municipale du Blanc; Musée d'Argentomagus.
- Forbes, Robert James. 1965. *Studies in Ancient Technology*. Vol. 4. Leiden: Brill.
- Francovich, Géza de. 1966. "Problems of Achaemenid Architecture." *East and West* 16 (3–4): 201–60.
- Fridell Anter, K. 2006. "Colours in Pompeian Cityscape." *Color Research and Application* 31 (4): 331–40.
2008. "Colouring the Past: On Colour in Archaeological Research." *Color Research and Application* 33 (4): 327–34.
- Fulcher, Kate. 2018. "Colour Taskscapes in Ancient Sudan." In *Current Research in Nubian Archaeology*, edited by Samantha Tipper and Gemma Tully, 23–36. Piscataway, NJ: Gorgias Press.
2022. *Painting Amara West. The Technology and Experience of Colour in New Kingdom Nubia*. Leuven: Peeters.
- Fulcher, Kate, Neal Spencer, Julia Budka, and Rebecca Stacey. 2022. "Polysaccharide Paint Binding Media at Two Pharaonic Settlements in Nubia." *Heritage* 5: 2028–40. <https://doi.org/10.3390/heritage5030106>
- Gage, John. 1993. *Color and Culture: Practice and Meaning from Antiquity to Abstraction*. Boston: Little, Brown.
- Gage, John, A. Jones, R. Bradley, K. Spence, E. Barber, and P. Taçon. 1999. "Viewpoint:

- What Meaning Had Colour in Early Societies?" *Cambridge Archaeological Journal* 9: 109–26.
- Garcia, Nacho. 2008. "Classic Sceneries: Setting Ancient Greece in Film Architecture." In *Hellas on Screen: Cinematic Receptions of Ancient History, Literature and Myth*, edited by Irene Berti and Marta Garcia Morcillo, 21–38. Stuttgart: F. Steiner.
- García Ureña, Lourdes, Emanuela Valeriani, Anna Angelini, Carlos Santos Carretero, and Marina Salvador Gimeno, eds. 2022. *The Language of Colour in the Bible: Embodied Colour Terms Related to Green*. Berlin: De Gruyter.
- Garelli, Paul. 1990. "La conception de la Beauté en Assyrie." In *Lingering over Words: Studies in Ancient Near Eastern Literature in Honor of William L. Moran*, edited by Tzvi Abusch, John Huehnergard, Piotr Steinkeller, 173–7. Atlanta: Scholars Press.
- Garrison, Mark. 1991. "Seals and the Elite at Persepolis: Some Observations on Early Achaemenid Persian Art." *Ars Orientalis* 21: 1–29.
1996. "A Persepolis Fortification Seal on the Tablet MDP 11 308 (Louvre Sb 13078)." *Journal of Near Eastern Studies* 55: 15–35.
2000. "Achaemenid Iconography as Evidenced by Glyptic Art: Subject Matter, Social Function, Audience and Diffusion." In *Images as Media: Sources for the Cultural History of the Near East and the Eastern Mediterranean (1st Millennium BCE)*, edited by Christoph Uehlinger, 115–63. Fribourg: University Press.
2011. "The Seal of Kuraš the Anzanite, Son of Šešpeš (Teispes), PFS 93: Susa-Anšan-Persepolis." In *Elam and Persia*, edited by Javier Alvarez-Mon and Mark Garrison, 375–405. Winona Lake, IN: Eisenbrauns.
- The Ritual Landscape at Persepolis*. Chicago: The Oriental Institute.
- Garrison, Mark and Margaret Cool Root. 2001. *Seals on the Persepolis Fortification Tablets*. Vol. 1, *Images of Heroic Encounters*. Chicago: The Oriental Institute.
- Gaspa, Salvatore. 2014. "Golden Decorations in Assyrian Textiles: An Interdisciplinary Approach." In *Prehistoric, Ancient Near Eastern and Aegean Textiles and Dress*, edited by Mary Harlow, Cecile Michel, and Marie-Louise Nosch, 227–44. Oxford: Oxbow Books.
2017. "Garments, Parts of Garments, and Textile Techniques in the Assyrian Terminology: The Neo-Assyrian Textile Lexicon in the 1st–Millennium BC Linguistic Context." In *Textile Terminologies from the Orient to the Mediterranean and Europe, 1000 BC to 1000 AD*, edited by Salvatore Gaspa, Cecile Michel, and Marie-Louise Nosch, 47–90. Lincoln, NE: Zea Books.
- Gates, Jennifer. 2002. "The Ethnicity Name Game: What Lies behind 'Graeco-Persian'?" In "Medes and Persians: Reflections on Elusive Empires," edited by Margaret Cool Root. *Ars Orientalis* 32: 105–32.
- Gätje, Helmut. 1967. "Zur Farbenlehre in der muslimischen Philosophie." *Der Islam* 43 (3): 280–301.
- Gau, François C. 1822. *Les antiquités de Nubie ou monuments inédits des bords du Nil situés entre la première et la seconde cataracte, dessinés et mesurés en 1819*. Paris: Didot.
- Gaugengigl, Ignaz. 1870. *Beschreibung der Merkwürdigkeiten im Assyrischen Saale der Koeniglichen Glyptothek zu München*. Munich: Fritsch.
- Gebhard, Rupert, E. Blumenau, J., Bruenner, E. Emmerling, Patrick Dietemann, A. Grimm, Guenter Grundmann, S. Gussmann, E. Höfle, Kristina Holl, B. Jändl, M. Pfanner, A. Rommel, Martin Schaich, R. Snethlage, M. Sonnenwald, J. Stolz, Heike Stege, L. Thiemann, and N. Wagner. 2009. "The Polychromy of Neoassyrian Bas-Reliefs from the Northwest Palace of Ashurnasirpal II at Nimrud. First Results from the München Study." *Wenbo. Relics and Museology* 2009 (6): 332–41.
- Genito, Bruno and Giulio Maresca, eds. 2016. *Ceramics and the Archaeological Achaemenid*

- Horizon. Near East, Iran and Central Asia.* Naples: Università di Napoli "L'Orientale."
- Gerharz, Rudolf, Renate Lantermann, and Dirk Spennemann. 1986. "Munsell Farbtafeln: Eine Notwendigkeit für die Archäologen?" *Acta praehistorica et archaeologica* 18 (1986): 177–87.
- Gettens, Rutherford John. 1937–8. "The Materials in the Wall Paintings from Bamiyan, Afghanistan." *Technical Studies in the Field of the Fine Arts* 6: 186–93.
- Ghazvinian, John. 2021. *America and Iran: A History, 1720 to the Present.* New York: Knopf.
- Ghirshman, Roman. 1948. "Un ossuaire en pierre sculptée." *Artibus Asiae* 11 (4). 1961. *Sept mille ans d'art en Iran. Octobre 1961–Janvier 1962.* Paris: Petit Palais. 1963. "L'Apadana de Suse." *Iranica Antiqua* 3: 148–54.
- Ghorbani, Mansour. 2013. *The Economic Geology of Iran: Mineral Deposits and Natural Resources.* Dordrecht: Springer.
- Gianoncelli, Alessandra, Jacques Castaing, Luc Ortega, Eric Dooryhée, M. Eveno, Joseph Salomon, Pierre Bordet, Jean-Louis Hodeau, and Philippe Walter. 2007. "A Portable XRF-XRD Instrument for In-Situ Analysis of Cultural Heritage Objects." In *Conservation Science 2007*, edited by Joyce Townsend, Lucia Toniolo, and Francesca Cappitelli, 189–94. London: Archetype Publications.
- Giovinazzo, Grazia. 1994. "Les documents de voyage dans les textes de Persépolis. Les voyages de Darius dans les régions orientales de l'empire." *Annali dell'Istituto Universitario Orientale di Napoli* 54: 18–45.
2012. "Gli artigiani della pietra a Persepoli." In *Persepolis and Its Settlements. Proceedings of the Conference Held in Viterbo, 16–17th December 2010*, edited by Gian-Pietro Basello and Adriano Rossi, 121–38. Naples: Università di Napoli "L'Orientale."
- Giron, Noel. 1921. "Vase quadrilingue au nom d'Artaxerxès." *Revue d'assyriologie et d'archéologie orientale* 18: 143–5.
- Gleba, Margarita. 2008. "Auratae Vestes: Gold Textiles in the Ancient Mediterranean." In *Purpureae Vestes II*, edited by Carmen Alfaro and Lilian Karalli, 61–77. Valencia: Universidad de Valencia.
- Glendinning, Miles. 2013. *The Conservation Movement: A History of Architectural Preservation: Antiquity to Modernity.* London: Routledge.
- Glozzo, Elisabetta. 2007. "Supplying Italy with Black and White Pigments." In *Supplying Rome and the Roman Empire.* Journal of Roman Archaeology suppl. series 69, edited by Emanuele Papi and Michel Bonifay, 72–84. Portsmouth, RI: Journal of Roman Archaeology.
- Godard, André. 1952. "Les travaux de Persépolis." In *Archaeologica orientalia in Memoriam Ernst Herzfeld*, edited by George C. Miles, 119–28. Locust Valley, NY: J. J. Augustin.
- Godley, Alfred D., trans. 1975. *Herodotus. History.* Cambridge, MA: Harvard University Press and W. Heinemann.
- Goff, Clare. 1977. "Excavations at Baba Jan: The Architecture of the East Mound, Levels II and III." *Iran* 15: 103–40.
- Gondet, Sébastien. 2011. "Occupation de la Plaine de Persépolis au Ier millénaire av. J.-C. (Fars Central, Iran)." PhD thesis, Université Lyon 2. http://theses.univ-lyon2.fr/documents/lyon2/2011/gondet_s
2015. "Stratégies d'exploitation de la pierre à Persépolis à l'époque achéménide. Nouvelles données archéologiques." *Iranica Antiqua* 50: 279–331.
- Gondet, Sébastien, Kourosh Mohammadkhani, Marie-Laure Chambrade, Morteza Djamali, Mahdokht Farjamirad, Nabil Ibnoerrida, and Jean-Baptiste Rigot. 2021. "Approaching Past Landscape Management in the Field Pluridisciplinary and Multiscalar Studies in the Pasargadae Region (Fars Province, Iran)." In *Paleopersepolis: Environment, Landscape and Society in Ancient Fars*, edited by Silvia Balatti, Hilmar Klinkott, and Josef Wiesehöfer, 95–119. Stuttgart: F. Steiner.

- González Mozo, Ana. 2016. "The Eternal Life of the Painting: Obliteration versus the Brilliance of the Artist's Genius." *Kermes: Rivista del restauro, conservazione e tutela del patrimonio culturale* 101–2 (January–June): 31–8.
- Goossens, Godeffroy. 1949. "Artistes et artisans étrangers en Perse sous les achéménides." *La Nouvelle Clío* 1: 32–44.
- Graeve, Volkmar von. 1970. *Der Alexandersarkophag und seine Werkstatt*. Berlin: Mann.
- Gran-Aymerich, Éve and Jean Gran-Aymerich. 1991. *Jane Dieulafoy, une vie d'homme*. Paris: Perrin.
- Grand-Clément, Adeline. 2015. "Poikilia." In *A Companion to Ancient Aesthetics*, edited by Pierre Destrée and Penelope Murray, 406–21. Hoboken, NJ: Wiley.
- Granger, A. 1933. "Le bleu assyrien." *Revue Assyriologique* 30: 150.
- Green, Lorna. 2001. "Colour Transformations of Ancient Egyptian Pigments." In *Colour and Painting in Ancient Egypt*, edited by Vivian W. Davies, 43–8. London: British Museum Press.
- Greenberg, Raphael and Yannis Hamilakis. 2022. *Archaeology, Nation, and Race: Confronting the Past, Decolonizing the Future in Greece and Israel*. Cambridge: Cambridge University Press.
- Grelot, Pierre. 1972. *Documents Araméens d'Égypte*. Paris: Éditions du Cerf.
- Grenet, Frantz, J. Lee, P. Martinez, and F. Ory. 2007. "The Sasanian Relief in Rag-i Bibi, Northern Afghanistan." In *After Alexander. Central Asia before Islam*, edited by Joel Cribb and Georgina Herrmann, 243–67. Oxford: Oxford University Press.
- Gries, Helen. 2022. *The Ishtar Gate of Babylon. From Fragment to Monument*. Regensburg: Schnell & Steiner.
- Gries, Helen and Anja Fügert, eds. 2020. *Glazed Brick Decoration in the Ancient Near East. Proceedings of a Workshop at the 11th International Congress of the Archaeology of the Ancient Near East (Munich) in April 2018*. Oxford: Archaeopress.
- Grigor, Talinn. 2004. "Recultivating 'Good Taste': The Early Pahlavi Modernists and Their Society for National Heritage." *Iranian Studies* 37: 17–45.
- 2005a. "Preserving the Antique Modern: Persepolis." *Future Anterior: Journal of Historic Preservation History, Theory and Criticism* 2 (1): 22–9.
- 2005b. "Cultivat(ing) Modernities: The Society for National Heritage, Political Propaganda and Public Architecture in 20th century Iran." PhD diss., Massachusetts Institute of Technology.
- 2009a. *Building Iran: Modernism, Architecture, and National Heritage under the Pahlavi Monarchs*. New York: Periscope Publishing.
- 2009b. "Orientalism and Mimicry of Selfness: Archaeology of the Neo-Achaemenid Style." In *L'orientalisme architectural entre imaginaires et savoirs*, edited by Nabila Oulebsir and Mercedes Volait, 273–90. Paris: CNRS.
2021. *The Persian Revival: The Imperialism of the Copy in Iranian and Parsi Architecture*. University Park, PA: Penn State University Press.
- Grimaldi, Mario. 2021a. "Pictores (Painters): The Social Role, Organization and Technique of Anonymous Artists." In *The Painters of Pompeii: Roman Frescoes from the National Archaeological Museum of Naples*, edited by Mario Grimaldi, 20–7. Rome: MondoMostre.
- 2021b. *The Painters of Pompeii: Roman Frescoes from the National Archaeological Museum of Naples*. Rome: MondoMostre.
- Groemer, Karina and Shahrzad Amin Shirazi. 2020. "Textilen: Eine Bunte Welt." In *Tod im Salz. Eine Archäologische Ermittlung in Persien*, edited by Thomas Stöllner, Abolfazl Aali, and Natascha Bagherpour-Kashani, 181–6. Bochum: Nünnerich Asmus.
- Gropp, Gerd. 2009. "Die Darstellung der 23 Völker auf den Reliefs des Apadana in Persepolis." *Iranica Antiqua* 44: 283–359.
- Guidi, G. S. Rahbar, S. Rahmati, R. Sheikoleslami, M. Soleimani, G. Trojsi,

- and A. Zare. 2008. "Diagnostic Survey of Persepolis Terrace. Preliminary Results. A Report Submitted to the Parsa-Pasargadae Research Foundation." Unpublished report, Persepolis.
- Guimier-Sorbets, Anne-Marie, Miltiades Hatzopoulos, and Yvette Mozot, eds. 2006. *Rois, cités, nécropoles: Institutions, rites et monuments en Macédoine. Actes des colloques de Nanterre (décembre 2002) et d'Athènes (janvier 2004)*. Athens: Centre de recherches de l'antiquité grecque et romaine.
- Gummerus, Herman. 1913. "Darstellungen aus dem Handwerk auf römischen Grab- und Votivsteinen in Italien." *Jahrbuch des deutschen Archäologischen Instituts* 28: 63–126.
- Gunter, Ann, ed. 1990. *Investigating Artistic Environments in the Ancient Near East*. Washington, DC: Smithsonian Institution.
- Gunter, Ann and Stefan Hauser, eds. 2005. *Ernst Herzfeld and the Development of Near Eastern Studies, 1900–1950*. Leiden: Brill.
- Gunter, Ann and Margaret Cool Root. 1998. "Replicating, Inscribing, Giving: Ernst Herzfeld and Artaxerxes' Silver Phiale in the Freer Gallery of Art." *Ars Orientalis* 28: 3–40.
- Guralnick, Eleanor. 2002. "New Drawings of Khorsabad Sculptures by Paul-Émile Botta." *Revue d'Assyriologie et d'Archéologie Orientale* 95: 23–56.
2010. "Color at Khorsabad: Palace of Sargon II." In *Proceedings of the 6th International Congress of the Archaeology of the Ancient Near East, 5th–10th May 2009, Rome*. Vol. 1, edited by Paolo Matthiae, Frances Pinnock, Lorenzo Nigro, and Nicolò Marchetti, 781–92. Wiesbaden: Harrassowitz.
- Gutscher, Daniel, Bruno Mühlethaler, Armin Portman, and Armin Reller. 1989. "Conversion of Azurite into Tenorite." *Studies in Conservation* 34: 117–22.
- Haberland, Detlef, ed. 2005. *Engelbert Kaempfer (1651–1716): Ein Gelehrtenleben zwischen Tradition und Innovation*. Wiesbaden: Harrassowitz.
- Hagenauer, Sebastian. 2015. "Bilder vergangener Kulturen. Architektur Rekonstruktionen in der Vorderasiatischen Archäologie des 19. und 20. Jahrhunderts." *Alter Orient Aktuell* 13: 4–9.
- Hall, Edith. 1989. *Inventing the Barbarian: Greek Self-Definition through Tragedy*. Oxford: Oxford University Press.
- Hallock, Richard T. 1960. "A New Look at the Persepolis Treasury Tablets." *Journal of Near Eastern Studies* 19 (2): 90–100.
1969. *Persepolis Fortification Tablets*. Oriental Institute Publications 92. Chicago: The Oriental Institute.
- Hamilakis, Yannis. 2009. "The 'War on Terror' and the Military-Archaeology Complex: Iraq, Ethics, and Neo-Colonialism." *Archeologies* 5 (1): 39–65.
2014. *Archaeology and the Senses: Human Experience, Memory and Affect*. Cambridge: Cambridge University Press.
- Hammer, Karl. 1968. *Jakob Ignaz Hittorff: Ein Pariser Baumeister, 1792–1867*. Stuttgart: A. Hirsemann.
- Hammond, Nicholas. 1992. "The Archaeological and Literary Evidence for the Burning of the Persepolis Palace." *Classical Quarterly* 42: 358–64.
- Hammond, Philip. 1996. *The Temple of the Winged Lions. Petra, Jordan. 1973: 1990*. Fountain Hills, AZ: Petra Publications.
- Hansen, Svend, Alfried Wiczorek, and Michael Tellenbach, eds. 2009. *Alexander der Grosse und die Öffnung der Welt. Asiens Kulturen im Wandel*. Regensburg: Schnell & Steiner.
- Harlez, Charles, de. 1890. "La perception des couleurs chez les peuples de l'extrême Orient et l'histoire du sens visuel." *Le Museon* 9: 242–9.
- Harris, Edward M. 2001. "Workshop, Marketplace and Household. The Nature of Technical Specialization in Classical Athens and Its Influence on Economy and Society." In *Money, Labour and Land: Approaches to the Economics of Ancient Greece*, edited by Paul Cartledge, Edward E. Cohen, and Lin Foxhall, 67–99. London: Routledge.
- Harris, Walter. 1896. *From Batum to Baghdad*. Edinburgh: W. Blackwood & Sons.

- Harrison, Thomas 2007. "Respectable in Its Ruins: Achaemenid Persia, Ancient and Modern." In *A Companion to Classical Receptions*, edited by Lorna Hardick and Christopher Stray, 50–61. Oxford: Blackwell.
2011. *Writing Ancient Persia*. London: Bristol Classical Press.
- Hartwig, Melinda. 2013. *The Tomb Chapel of Menna: The Art, Culture, and Science of Painting in an Egyptian Tomb*. Cairo: American University in Cairo Press.
- Hase, Friedrich-Wilhelm von. 2009. "Das Alexandermosaik: ein Mosaikgemälde und seine Interpretationsprobleme." In *Alexander der Grosse und die Öffnung der Welt. Asiens Kulturen im Wandel*, edited by Svend Hansen, Alfred Wiczorek, and Michael Tellenbach, 66–75. Regensburg: Schnell & Steiner.
- Haskell, Francis and Nicholas Penny. 1981. *Taste and the Antique: The Lure of Classical Sculpture, 1500–1900*. New Haven, CT: Yale University Press.
- Hassanzadeh, Yousef and John Curtis. 2021. *The Exhibition of a Repatriated Boukan Glazed Brick Collection from Switzerland*. Tehran: Iran National Museum.
- Hassler, Uta. 2019. "Description de l'Égypte. Ein Monument zur Drucktechnik." In *Polychromie und Wissen*, edited by Uta Hassler, 159–69. Munich: Hirmer.
- Haussknecht, Carl. 1868. "Mittheilung von C. Haussknecht's botanischen Reisen in Kurdistan und Persien (1865–67)." *Zeitschrift der Gesellschaft für Erdkunde zu Berlin* 3: 464–73.
- Heilmeyer, Wolf Dieter. 1981. "Antike Werkstattfunde in Griechenland." *Archäologischer Anzeiger* 440–5.
- Hejl, E. 2005. "Prehistoric Pigment Mining on Santorini's Neighbouring Island Anafi." *Austrian Journal of Earth Sciences* 98: 22–33.
- Hellmann, Marie-Christine. 2014. "Polychromy in Greek Architecture." In *Transformations. Classical Sculpture in Colour*, edited by Jan Stubbe Østergaard and Anne Marie Nielsen, 224–35. Copenhagen: Ny Carlsberg Glyptotek.
- Helwing, Barbara. 2021. "Patterns of Early Metallurgy on the Iranian Plateau, from the Beginnings to the End of the Bronze Age." In *On Salt, Copper and Gold. The Origins of Early Mining and Metallurgy in the Caucasus*, edited by Catherine Marro and Thomas Stöllner, 201–30. Lyon: MOM Éditions.
- Helwing, Barbara and Patricia Rahempour, eds. 2011. *Tehran 50. Ein halbes Jahrhundert deutsche Archäologen in Iran*. Mainz: Zabern.
- Hendrix, Elizabeth. 2000. "The Paint Motifs on Early Cycladic Figures." PhD diss. New York University Institute of Fine Arts.
- Henkelman, Wouter F. 1997. "The Royal Achaemenid Crown." *Archäologische Mitteilungen aus Iran* n.s. 28: 275–94.
2008. *The Other Gods Who Are. Studies in Elamite-Iranian Acculturation Based on the Persepolis Fortification Texts*. Achaemenid History 14. Leiden: Netherlands Institute for the Near East.
2011. "Parnakka's Feast: šīp in Parsa and Elam." In *Elam and Persia*, edited by Javier Alvarez-Mon and Mark Garrison, 89–166. Winona Lake, IN: Eisenbrauns.
2013. "Administrative Realities: The Persepolis Archives and the Archaeology of the Achaemenid Heartland." In *The Oxford Handbook of Ancient Iran*, edited by Daniel T. Potts, 528–46. Oxford: Oxford University Press.
- 2017a. "Imperial Signature and Imperial Paradigm Achaemenid Administrative Structure and System across and beyond the Iranian Plateau." In *Die Verwaltung im Achämenidenreich: Imperiale Muster und Strukturen/Administration in the Achaemenid Empire: Tracing the Imperial Signature*, edited by Bruno Jacobs, Wouter F. Henkelman, and Matthew W. Stolper, 45–256. Wiesbaden: Harrassowitz.
- 2017b. "Egyptians in the Persepolis Archives." In *Ägypto-Persische Herrscher- und Herrschaftsrepräsentation in der Achämeniden Zeit*, edited by Melanie Wasmuth, 273–99. Stuttgart: F. Steiner.
2021. "Local Administration: Persia." In *A Companion to the Achaemenid Persian*

- Empire*. Vol. 2, edited by Bruno Jacobs and Robert Rollinger, 881–904. Hoboken, NJ: Wiley.
- Henkelman, Wouter F. and Kristin Kleber. 2007. “Babylonian Workers in the Persian Heartland: Palace Building at Matannan during the Reign of Cambyses.” In *Persian Responses: Political and Cultural Interaction with(in) the Achaemenid Empire*, edited by Christopher Tuplin, 163–76. Swansea: Classical Press of Wales.
- Henkelman, Wouter F. and Matthew W. Stolper. 2009. “Ethnic Identity and Ethnic Labeling at Persepolis.” In *Organisation des pouvoirs et contacts culturels dans les pays de l’empire achéménide. Actes du colloque organisé au Collège de France, 9–10 novembre 2007*. Persika 14, edited by Pierre Briant and Michel Chauveau, 271–330. Paris: De Boccard.
- Hennemeyer, Arnd. 2017. “Antike Architekturpolychromie im 19. Jahrhundert. Mit wissenschaftlicher Methode und künstlerischer Einfühlung vom Fragment zum Gesamtbild.” In *Langfristperspektiven archäologischer Stätten. Wissensgeschichte und forschungsgeleitete Konservierung*, edited by Uta Hassler, 275–98. Munich: Hirmer.
2019. “Die Publikation antiker Architekturpolychromie im 19. Jahrhundert.” In *Polychromie und Wissen*, edited by Uta Hassler, 159–69. Munich: Hirmer.
- Hennessey, Colleen. 1992. “The Ernst Herzfeld Papers at the Freer Gallery of Art and Arthur M. Sackler Gallery Archives.” *Bulletin of the Asia Institute* 6: 131–41.
- Henry, Alison, ed. 2006. *Stone Conservation: Principles and Practice*. Shaftesbury: Donhead.
- Herbert, Thomas. 1634. *Description of the Persian Monarchy Now Being the Oriental Indyes, Iles and Other Parts of the Greater Asia and Africk*. London: William Stansby.
- Hermann, Peter. 1975. “Milesischer Purpur.” *Istanbuler Mitteilungen* 25: 141–7.
- Herrmann, Georgina. 1966. “The Source, Distribution, History and Use of Lapis Lazuli in Western Asia from the Earliest Times to the End of the Seleucid Era.” Unpublished PhD diss., University of Oxford.
1968. “Lapis Lazuli: The Early Phases of Its Trade.” *Iraq* 30: 21–57.
2000. “Taste, Perception and Colour: A Critical Survey.” In *Variatio delectat, Iran und der Westen: Gedenkschrift für Peter Calmeyer*, edited by Reinhard Dittmann, 347–54. Münster: Ugarit-Verlag.
2017. *Ancient Ivory: Masterpieces of the Assyrian Empire*. London: Thames & Hudson.
- Herrmann, Georgina, Stuart Laidlaw, and Helena Coffey. 2009. *Ivories from Nimrud VI: Ivories from the North West Palace (1845–1992)*. London: British Institute for the Study of Iraq.
- Herzfeld, Ernst. 1908. “Pasargadae. Untersuchungen zur persischen Archäologie.” *Klio* 8: 1–68.
1915. “Die Tabula Ansata in der islamischen Epigraphik und Ornamentik.” *Der Islam* 6: 189–99.
1920. *Am Tor von Asien. Felsdenkmäler aus Irans Heldenzeit*. Berlin: D. Reimer.
1928. *Rapport sur l’état actuel des ruines de Persépolis et propositions pour leur conservation*. Berlin: D. Reimer.
1929. “Bericht über die Ausgrabungen von Pasargadae 1928.” *Archäologische Mitteilungen aus Iran* 1: 4–16.
1931. “Die Magna Charta von Susa.” *Archäologische Mitteilungen aus Iran* 3: 29–81.
1933. “Xerxes in Ancient Persian Art. The Colour of Treasures from the Great Persepolis Discovery.” *The Illustrated London News*, April 8, 1933, 488–9.
1938. *Altpersische Inschriften*. Berlin: D. Reimer.
1941. *Iran in the Ancient East*. Oxford: Oxford University Press.
1968. *The Persian Empire. Studies in Geography and Ethnography of the Ancient Near East* (posthumous papers), edited by G. Walser. Wiesbaden: F. Steiner.
- n.d. Unpublished Papers. Archives of the Oriental Institute, Chicago; National

- Museum of Asian Art, Washington, DC; Metropolitan Museum of Art Archives, New York.
- Herzfeld, Ernst and Friedrich Sarre. 1910. *Iranische Felsreliefs*. Berlin: E. Wasmuth.
- Hillenbrand, Robert, ed. 2001. *Persian Paintings: From the Mongols to the Qajars*. London: I. B. Tauris.
- Hinz, Walther. 1971. "Achämenidische Hofverwaltung." *Zeitschrift für Assyriologie* 61: 260–311.
- ed. 1984. *Engelbert Kaempfer: Am Hofe des persischen Großkönigs (1684–1685)*. Tübingen: H. Erdmann.
- Hittorf, Johann. 1830. "De l'architecture polychrome chez les Grecs." *Annales de l'Institut de Correspondance Archéologique* 2: 263–84.
- 1846–51. *Restitution du temple d'Empédocle à Sélinonte, ou l'architecture polychrome chez les Grecs*. Paris: Didot.
- Hodjat, Mehdi. 1995. "Cultural Heritage in Iran: Politics for an Islamic Country." PhD diss., University of York.
- Hoeppe, Goetz. 2007. *Why Is the Sky Blue? Discovering the Color of Life*. Princeton, NJ: Princeton University Press.
- Holakooei, Parviz. 2013. "A Multi-Spectroscopic Approach to the Characterization of Early Glaze Opacifiers: Studies on an Achaemenid Glazed Brick Found at Susa, South-Western Iran (Mid-First Millennium BC)." *Spectrochimica Acta* 116: 49–56.
2014. "A Technological Study of Elamite Polychrome Glazed Bricks at Susa, South-Western Iran." *Archaeometry* 56 (5): 764–83.
2016. "A Mediaeval Persian Treatise on Coloured and Enamelled Glass: Bayan Al-Sana'at." *Journal of the British Institute of Persian Studies* 54: 95–106.
2020. "Scientific Research on the Iron Age Glazes from Iran and Iraq: Past and Future." In *Gries and Fügert* 2020: 16–27.
- Holakooei, Parviz, A. Abed-Esfahani, S. Samanian, and H. Aslani. 2013. "A Technological Study on the 17th Century Raised Gilded Substrates in Three Royal Palaces in Isfahan, Iran." *Open Journal of Archaeometry* 1: 99–103.
- Holakooei, Parviz, M. Achmadi, L. Volpe, and C. Vaccaro. 2016. "Early Opacifiers in the Glaze Industry of First Millennium BC Persia: Persepolis and Tepe Raba." *Archaeometry* 59 (2): 239–54.
- Holakooei, Parviz, Amir-Hossein Karimy, and Carmela Vaccaro. 2014. "A Multi-Analytical Approach to the Examination of Nineteenth-Century European Wallpapers in Vasiq-Ansari House in Isfahan, Iran." *Studies in Conservation* 59: 150–60.
- Homayoun, Fahimeh, Younes Zare, and Siroos Zare. 2021. "Stoneworking Techniques at Persepolis from Quarry to the Terrace." *Iranian Journal of Archaeological Studies* 11.2: 125–9.
- Hori, Akira and Keiko Ishida. 1986. *The Lapis Lazuli Road*. Tokyo: Ancient Orient Museum.
- Houston, Stephen. 2009. *Veiled Brightness. A History of Ancient Maya Color*. Austin: University of Texas Press.
- Hrvol Flores, Carol A. 2006. *Owen Jones: Design, Ornament, Architecture, and Theory in an Age in Transition*. New York: Rizzoli.
- Hu, Wenjing, Kun Zhang, Hui Zhang, and Bo Rong. 2014. "Analysis of Polychrome Binder on Qui Shihuang's Terracotta Warriors by Immunofluorescence Microscopy." *Journal of Cultural Heritage* 16 (2): 244–8.
- Huff, Dietrich and Philippe Gignoux. 1978. "Ausgrabungen auf Qal'a-ye Dukhtar bei Firuzabad 1976." *Archäologische Mitteilungen aus Iran* n.s. 11: 117–50.
- Hulbert, Anna. 1998. "English Fourteenth Century Interior Polychromy: Manuscript Sources and Workshop Practice at Exeter Cathedral." In *Painting Techniques: History, Materials and Studio Practice*, edited by Ashok Roy and Perry Smith, 35–9. London: International Institute for Conservation of Historic and Artistic Works.
- Humphrey, John R., ed. 1999. *The Roman and Byzantine Near East*. Vol. 2. Journal of Roman Archaeology suppl. series 31. Portsmouth, RI: Journal of Roman Archaeology.

- Ingo, Gabriel M., Altan Çilingiroğlu, Gabriella Di Carlo, Atila Batmaz, Tilde De Caro, Cristina Riccucci, Erica I. Parisi, and Federica Faraldi. 2013. "Egyptian Blue Cakes from the Ayanis Fortress (Eastern Anatolia, Turkey): Micro-Chemical and -Structural Investigations for the Identification of Manufacturing Process and Provenance." *Journal of Archaeological Science* 40: 4283–90.
- Işık, Cengiz. 2019. *Die Wandmalereien in der Grabkammer des Hekatomneions: Beobachtungen zu Figurentypen, zur Komposition, Ikonographie und zum Stil*. Bonn: Dr. Rudolf Habelt GmbH.
- Jacksch, Heiner. 1985. "Farbpigmente aus Wandmalereien altägyptischer Gräber und Tempel: Technologien der Herstellung und mögliche Herkunftsbeziehungen." PhD diss., Karl-Rupprecht Universität.
- Jackson, Abraham V. W. 1890. "On the Sense of Color in the Avesta." *Journal of the American Oriental Society* 14: clxii–clxv.
- Jacobs, Bruno. 2021a. "The Residences." In *A Companion to the Achaemenid Persian Empire*, edited by Bruno Jacobs and Robert Rollinger, 1007–34. Hoboken, NJ: Wiley.
- 2021b. "Achaemenid Art: Art in the Achaemenid Empire." In *A Companion to the Achaemenid Persian Empire*, edited by Bruno Jacobs and Robert Rollinger, 749–68. Hoboken, NJ: Wiley.
- Jacobs, Bruno and Robert Rollinger, eds. 2021. *A Companion to the Achaemenid Persian Empire*. Hoboken, NJ: Wiley.
- Jäger, Stephan. 2004. *Altägyptische Berufstypologien*. Göttingen: Seminar für Ägyptologie und Koptologie.
- Jakob-Rost, Liane, ed. 1992. *Das Vorderasiatische Museum Berlin*. Mainz: Zabern.
- Jastrow, Morris Jr. 1888. "Persian Art from Susa. 'Finds' by the Dieulafoys Taken to Paris." *New York Times* (December 9, 1888): 13.
- Jenkins, Ian. 1990. "Acquisition and Supply of the Casts of the Parthenon Sculptures by the British Museum 1835–1939." *The Annual of the British School of Archaeology at Athens* 85: 89–114.
1992. *Archaeologists and Aesthetes in the Sculpture Galleries of the British Museum 1800–1939*. London: British Museum Press.
2001. *Cleaning and Controversy: The Parthenon Sculptures 1811–1939*. British Museum Occasional Paper 146. London: British Museum.
2006. *Greek Architecture and Its Sculpture*. London: British Museum.
- Jenkins, Ian, Corrado Gratzu, and Andrew Middleton. 1997. "The Polychromy of the Mausoleum." In *Sculptors and Sculptures of Caria and the Dodecanese*, edited by Ian Jenkins and Geoffrey Waywell, 35–41. London: British Museum Press.
- Jenkins, Ian and Andrew Middleton. 1988. "Paint on the Parthenon Sculptures." *Annual of the British School at Athens* 83: 183–207.
- Jenkins, Ian and Geoffrey Waywell. 1997. *Sculptors and Sculptures of Caria and the Dodecanese*. London: British Museum Press.
- Jeppesen, Kristian and Anthony Luttrell. 1986. *The Mausolleion at Halikarnassos. Reports of the Danish Archaeological Expedition to Bodrum. Vol. 2, The Written Sources and Their Archaeological Background*. Copenhagen: Nordisk Forlag.
- Jéquier, Gustave 1901. "Description du site de Malamir." *Mémoires de la Délégation en Perse* 3: 133–43.
- Joannès, Francis. 2010. "Textile Terminology in the Neo-Babylonian Documentation." In *Textile Terminologies in the Ancient Near East and Mediterranean from the Third to the First Millennia bc*, edited by Cecile Michel and Marie-Louise Nosch, 400–8. Oxford: Oxbow Books.
2014. "Fabrics and Clothes from Mesopotamia during the Achaemenid and Seleucid Periods. The Textual References." In *Wool Economy in the Ancient Near East and the Aegean. From the Beginnings of Sheep Husbandry to Institutional Textile Industry*, edited by C. Breniquet and Cecile Michel, 454–65. Oxford: Oxbow Books.
- Jockey, Philippe. 2007. "Praxitèle et Nicias. Le débat sur la polychromie de la statuaire

- antique. La sculpture antique et la question de la couleur: De sa réception à l'époque moderne aux recherches contemporaines." In *Praxitèle*, edited by Alain Pasquier and Jean-Luc Martinez, 62–81. Paris: Musée du Louvre.
2013. *Le mythe de la Grèce blanche: un malentendu historique*. Paris: Belin.
- ed. 2018. *Les arts de la couleur en Grèce ancienne ... et ailleurs. Proceedings from a Conference held at Athens, April 2009*. Athens: École française d'Athènes.
- Jockey, Philippe and Brigitte Bourgeois. 2001. "Approches nouvelles de la polychromie des sculptures hellénistiques de Délos." *Comptes Rendus de l'Académie des Inscriptions et Belles Lettres* (January–March): 627–65.
2003. "Polychrome Hellenistic Sculpture in Delos. Research on Surface Treatments of Ancient Marble Sculpture. Part I." In *Interdisciplinary Studies on Ancient Stone. Proceedings of the Sixth International Conference, Venice, June 15–18, 2000*, edited by Lorenzo Lazzarini, 497–506. Padua: Bottega d'Erasmio.
- 2005a. "La dorure des marbres grecs. Nouvelle enquête sur la sculpture hellénistique de Délos." *Journal des Savants* 253–316.
- 2005b. "Polychrome Hellenistic Sculpture in Delos. Research on Surface Treatments of Ancient Marble Sculpture. Part II." In *Interdisciplinary Studies on Ancient Stone, Proceedings of the Seventh International Conference, Thasos, Greece, 15–20 September 2003*, edited by Yiannis Maniatis, 799–809. Athens: Ecole Française d'Athènes.
- 2005c. "D'or et de marbre: les sculptures hellénistiques dorées de Délos." *Bulletin de Correspondance Hellénique* 128: 331–49.
- Jockey, Philippe, Andreas Karydas, Hariclia Brekoulaki, and Brigitte Bourgeois. 2009. "In-Situ X-Ray Fluorescence Analysis of Raw Pigments and Traces of Polychromy on Hellenistic Sculpture at the Archaeological Museum of Delos." In *Maniatis* 2009: 811–29.
- Jokilehto, Jukka. 1986. "A History of Architectural Conservation: The Contribution of English, French, German and Italian Thought towards an International Approach to the Conservation of Cultural Property." PhD thesis, Institute of Advanced Architectural Studies, University of York.
1999. *A History of Architectural Conservation*. London: Routledge.
2009. "Conservation Principles in the International Context." In *Conservation: Principles, Dilemmas and Uncomfortable Truths*, edited by Alison Richmond and Alison Bracker, 73–83. Oxford: Butterworth-Heinemann.
- Jones, Andrew and Richard Bradley. 1999. "The Significance of Colour in European Archaeology." *Cambridge Archaeological Journal* 9: 112–4.
- Jones, Andrew and Gavin MacGregor, eds. 2002. *Colouring the Past: The Significance of Colour in Archaeological Research*. Oxford: Berg.
- Jones, Owen. 1854. *An Apology for the Coloring of the Greek Court in the Crystal Palace*. London: Bradbury & Evans.
- Jursa, Michael. 2015. "Labor in Babylonia in the First Millennium B.C." In *Labor in the Ancient World*, edited by Piotr Steinkeller and Michael Hudson, 345–96. Dresden: ISLET.
- Kaboli, Mir-Abedin. 2000. "The Apadana Gateway at Shush." *Iran* 38: 161–2.
- Kacharava, Darejan and Guram Kvirkelia. 2009. "Archaeological Excavations at Vani in 2002. A Preliminary Report." In *Archaeology in Southern Caucasus: Perspectives from Georgia*, edited by Antonio Sagona and Michael Abramischwili, 407–40. Leuven: Peeters.
- Kader, Ingeborg. 2004. "Täuschende Spielereien'. Kolorierte Abgüsse im 19. und 20. Jahrhundert." In *Bunte Götter: Die Farbigeit antiker Skulptur. Eine Ausstellung der Staatlichen Antikensammlungen und Glyptothek München, 16. Dezember 2003 bis 29. Februar 2004, 15. Juni–5. September 2004*, edited by Vinzenz Brinkmann and Raimund Wünsche, 235–46. Munich:

- Staatliche Antikensammlungen und Glyptothek.
- ed. 2008. *Begegnung in Bunt. Farbfassungen antiker chinesischer und griechischer Plastik im Vergleich; Sonderausstellung des Museums für Abgüsse Klassischer Bildwerke München anlässlich der XXIX. Olympischen Spiele in Peking, 18. Juni bis 29. August 2008*. Munich: Museum für Abgüsse Klassischer Bildwerke.
- Kaempfer, Engelbert. 1712. *Amonitatum exoticarum politico-physico-mediarum fasciculi V, quibus continentur variae relationes, observationes et descriptiones Rerum Persicarum et Ulterioris Asiae*. Lemgo: Meyer.
- Kakoulli, Ioanna. 2009. *Greek Painting Techniques and Materials: From the Fourth to the First Century bc*. London: Archetype Publications.
- Kaniuth, Kai. 2013. "Spätbabylonische Glasurziegelreliefs aus Borsippa." *Mitteilungen der Deutschen Orientgesellschaft* 145: 53–82.
2018. "The Transition from Neo-Babylonian to Achaemenid Glazed Brick Decoration." In *Übergangszeiten. Altorientalische Studien für Reinhard Dittmann anlässlich seines 65. Geburtstags*, edited by Kai Kaniuth, Daniel Lau, and Dirk Wicke, 343–59. Münster: Zaphon.
- Kantor, Helen J. 1957. "Achaemenid Gold Jewelry in the Oriental Institute." *Journal of Near Eastern Studies* 16: 1–23.
1985. *Stone Bull Head from Persepolis (Oriental Institute A 24065)*. Oriental Institute Museum Featured Object 3. Chicago: The Oriental Institute.
- Kaptan, Deniz. 2002. *The Daskyleion Bullae. Seal Images from the Western Achaemenid Empire*. Leiden: Nederlands Instituut voor het Nabije Oosten.
- Kargere, Lucretia. 2012. "La sculpture romane polychrome sur bois en Auvergne et Bourgogne: étude technique de quatre sculptures du Metropolitan Museum de New York." *Les Cahiers de Saint-Michel de Cuxa* 43: 111–21.
- Karimy, Amir Hossein and Parviz Holakooei. 2021. "Looking Like Silver: Mika as a Pigment in Mid-Seventeenth Century Persian Wall Decorations." *Iran* 59 (1): 109–18.
2022. "Blue 'Out of the Blue': Scientific Studies on the Blue Pigments Applied on Persian Stuccos." Presentation at Stucco Decoration in the Architecture of Iran and Neighbouring Lands: New Research – New Horizons, Conference, University of Bamberg, May 4–7, 2022.
- Karimy, D., Abdurassool Vatandoost, and K. Namagh. 2006. "Analysis of the Restoration of Murals from the Qajar Period." [in Persian] Unpublished master thesis, Azad University.
- Karlsson, Mattias. 2022. *From the Nile to the Tigris. African Individuals and Groups in Texts from the Neo-Assyrian Empire*. University Park, PA: Penn State University Press.
- Karmous, Tijani, Zohra Cherif, Naceur Ayed, and Claude Coupry. 2006. "Les peintures de terres cuites à Carthage. Identification des pigments de figurines et de fruits." *Revue d'archéométrie* 29: 43–50.
- Kasiri, Masoud, Shahrokh Shahrsabzi, Mohamadamin Emami, and Mehdi Razani. 2020. "Provenance of the Stones Used in Plinths of the Achaemenid Palaces of Borazjan, South-Western of Iran." *Journal of Archaeological Science. Reports* 29: 1–10.
- Kathem, Mehiyar and Dhiaa Kareem Ali. 2021. "Decolonizing Babylon." *International Journal of Heritage Studies* 27 (9): 831–45.
- Katsaros, Thomas and Constantinos Vasiliadis. 2019. "Polychromy in Greek Sculpture." In *Handbook of Greek Sculpture*, edited by Olga Palagia, 690–724. Berlin: De Gruyter.
- Kawase, Toyoko. 1984. "Female Workers 'Pasap' in the Persepolis Royal Economy." *Acta Sumerologica* 6: 19–31.
- Keene, Suzanne. 1996. *Managing Conservation in Museums*. Oxford: Butterworth-Heinemann.
- Kees, Hermann. 1943. "Farbensymbolik in ägyptischen religiösen Texten." *Nachrichten der Akademie der Wissenschaften Göttingen* 11: 413–79.

- Kent, Roland G. 1953. *Old Persian. Grammar, Texts, Lexicon*. 2nd ed. New Haven, CT: American Oriental Society.
- Keppel, George. 1827. *Personal Narrative of a Journey from India to England in the Year 1824*. London: Colburn.
- Kertai, David. 2015. *The Architecture of Late Assyrian Royal Palaces*. Oxford: Oxford University Press.
- Khandekar, Narayan. 2017. *Collecting Colour*. Arnhem: ArtEZ Press.
- Khazeni, Arash. 2014. *Sky Blue Stone: The Turquoise Trade in World History*. Berkeley: University of California Press.
- Khiabani, M. J. 2004. "A Study on the Erection of Protective Canopies over Stone Monuments in Persepolis." [in Persian] *PARSA* 1: 112–5.
- Kidd, Fiona, M. Negus Cleary, V. N. Yagodin, A. Betts, and E. Baker Brite. 2004. "Ancient Chorasmian Mural Art." *Bulletin of the Asia Institute* 18: 69–95.
- Kiene, Michael. 2019. "Hittorfs Farbproben aus Pompeji und sein Projekt einer französisch-deutschen Pompeji Edition." In *Polychromie und Wissen*, edited by Uta Hassler, 60–75. Munich: Hirmer.
- Kiene, Michael, Lorenzo Lazzarini, and Clemente Marconi. 2016. *Sicile Ancienne: Hittorff and the Architecture of Classical Sicily*. Cologne: Universitäts- und Stadtbibliothek.
- King, Rhyne. 2022. "Trips to the King, Taxation, and the New Year in the Persepolis Fortification Archive." *Iran* 60 (2).
- Kirby, Jo, Joanna Cannon, and Susie Nash, eds. 2010. *Trade in Artists' Materials. Markets and Commerce in Europe to 1700*. London: Archetype Publications.
- Kjerrman, Pontus. 2004. *Spejlinger i Gips. Reflections in Plaster. An Exhibition at the Danish Art Academy in Copenhagen*. Copenhagen.
- Kleiss, Wolfram. 1981. "Ein Abschnitt der achämenidischen Königsstraße von Pasargadae und Persepolis nach Susa, bei Naqsh-e-Rustam." *Archäologische Mitteilungen aus Iran* n.s. 14: 45–53.
- Klemm, Rosemarie. 2013. *Gold and Gold Mining in Ancient Egypt and Nubia: Geoarchaeology of the Ancient Gold Mining Sites in the Egyptian and Sudanese Eastern Deserts*. Heidelberg: Springer.
- Knipping, Detlef. 2001. "Le Jupiter olympien and the Rediscovery of Polychromy in Ancient Sculpture." In *The Polychromy of Antique Sculptures and the Terracotta Army of the First Chinese Emperor*, edited by Catharina Blänsdorf, Erwin Emmerling, and Michael Petzet, 89–96. Munich: Bayerisches Landesamt für Denkmalpflege.
- Knuutinen, Ulla, Hanne Mannerheim, and Seppo Hornytkyj. 2007. "Analysis of Pigments from Pompeian Wall Paintings in the Huse of Marcus Lucretius." In *Conservation Science 2007*, edited by Joyce Townsend, Lucia Toniolo, and Francesca Cappitelli, 56–7. London: Archetype Publications.
- Koch, Heidemarie. 1986. "Die achämenidische Poststrasse von Persepolis nach Susa." *Archäologische Mitteilungen aus Iran* n.s. 19: 133–47.
2001. *Persepolis. Glänzende Hauptstadt des Perserreiches*. Mainz: Zabern.
- Koch, Nadja J. 2000. *Technik und Erfindung in der klassischen Malerei. Eine terminologische Untersuchung*. Munich: Biering & Brinkmann.
- Koren, Zvi. 2008. "Archaeo-Chemical Analysis of Royal Purple on a Darius I Stone Jar." *Microchimica Acta* 162 (3–4): 381–92.
- Kostomitsopoulou Marketou, Ariadne. 2019. "The Pigment Production Site of the Ancient Agora of Kos (Greece): Revisiting the Material Evidence." *Thiasos* 8 (1): 61–80.
- Kottaridi, Angeliki. 2006. "Couleur et signification: L'usage de la couleur dans la tombe de la reine Eurydice. In *Rois, cités, nécropoles: institutions, rites et monuments en Macédoine. Actes des colloques de Nanterre, décembre 2002 et d'Athènes, janvier 2004*, edited by Anne-Marie Guimier-Sorbets, Miltiade B. Hatzopoulos, and Yvette Morizot, 143–53. Paris: Diffusion de Boccard.
- Kouzeli, Kalliope. 1989. "Study on the Colored Layers Which Can Be Seen on the Surface

- of the Monuments.” In *Study for the Restoration of the Parthenon*, Vol. 2a, edited by Manolis Korres, 198–9 [in Greek]. Athens: Ministry of Culture, Committee for the Preservation of the Acropolis Monuments.
- Kouzeli, Kalliope, Yianna Dogani, and Nikos Belogiannis. 1990. “Study of the Remaining Colour on the Architectural Surfaces of the Parthenon.” In *Superici dell’Architettura: Le finiture. Atti del convegno di studi Bressanone 26–29 Giugno 1990*, edited by Guido Biscontin and Stefano Volpin, 241–3. Padua: Libreria Progetto.
- Krauss, Rolf. 1987–92. “75 Jahre Nofretete Büste in Berlin, Teil 1 und 2.” *Jahrbuch Preußischer Kulturbesitz* 24 (1987): 7–124, 28 (1992): 123–57.
- Krebernik, Manfred. 2013. “Die ‘Haussknechtiana’ in der Hilprecht-Sammlung.” in *Carl Haussknecht. Ein Leben für die Botanik, Beiträge aus den Sammlungen der Universität Jena 2*, edited by Frank Hellwig, 54–9. Jena: Friedrich-Schiller-Universität Jena.
- Kreiser, Klaus. 2008. “The Equestrian Statue of the Qajar Ruler Nasir al-Din Shah in Tehran (1888).” In *Iran und iranisch geprägte Kulturen. Studien zum 65. Geburtstag von Bert Fragner*, edited by Markus Ritter, Ralph Kauz, and Birgit Hoffmann, 389–98. Wiesbaden: Reichert.
- Krefter, Friedrich. 1967. “Zur Steinmetztechnik von Persepolis.” In *Festschrift für Wilhelm Eilers*, edited by Gernot Wiessner, 429–41, Wiesbaden: Harrassowitz.
1971. *Persepolis Rekonstruktionen*. Berlin: Mann.
1989. “Persepolis in Farbe.” *Archäologische Mitteilungen aus Iran* n.s. 22: 131–2.
1991. “Die roten Schuhe.” *Archäologische Mitteilungen aus Iran* n.s. 24: 57–9.
- Krengel-Strudthoff, Ingeborg. 1981. “Archäologie auf der Bühne: das wiedererstandene Ninive; Charles Keans Ausstattung zu Sardanapalus von Lord Byron.” *Kleine Schriften der Gesellschaft für Theatergeschichte* 31: 3–24.
- Krischel, Roland. 2011. “The Venetian Pigment Trade in the Sixteenth Century.” In *Colors between Two Worlds. The Florentine Codex of Bernardino de Sahagun*, edited by Gerhard Wolf and Joseph Connors, 317–32. Florence: Kunsthistorisches Institut in Florenz, Max-Planck-Institut, Villa I Tatti, the Harvard University Center for Italian Renaissance Studies.
- Kröger, Jens. 1982. *Sasanidischer Stuckdekor*. Mainz: Zabern.
2021. “Statue of a ‘Saint’ from the Church in Veh Ardashir.” In *Iran. Five Millennia of Art and Culture*, edited by Ute Franke and Stefan Weber, 123. Munich: Hirmer.
- Kuehn, H. 1970. “Fluoreszenzaufnahmen von griechischen Grabstelen.” *International Photo Technik* 1970 (2): 2–4, 52–5.
- Kühnenthal, Michael. 2004. “The Research on the Polychromy of Sculptures. An Introduction.” In *Historical Polychromy*, edited by Michael Kühnenthal and Sadatoshi Miura, 10–31. Munich: Hirmer.
- Kuhrt, Amélie. 2007. *The Persian Empire: A Corpus of Sources from the Achaemenid Period*. 2 vols. London: Routledge.
- Kuhrt, Nicola. 2013. “Protest aus Ägypten. Deutsche Hobbyforscher kratzen Proben aus der Cheops-Pyramide.” *Der Spiegel* November 21, 2013. www.spiegel.de/wissenschaft/mensch/cheops-pyramide-deutsche-hobbyforscher-kratzen-proben-von-der-decke-a-934939.html
- Laboury, Dimitri. 2012. “Tracking Ancient Egyptian Artists: The Problem of Methodology: The Case of the Painters of Private Tombs of the Theban Necropolis during the 18th Dynasty.” In *Art and Society: Ancient and Modern Contexts of Egyptian Art. Proceedings of the International Conference Held at the Museum of Fine Arts, Budapest, 13–15, 2010*, edited by Katalin A. Kothay, 199–208. Budapest: Museum of Fine Arts.
2016. “Le scribe et le peintre: à propos d’un scribe qui ne voulait être pris pour un peintre.” In *Aere perennius: mélanges égyptologiques en l’honneur de Pascal Vernus*,

- edited by Philippe Collombert, Dominique Lefèvre, Stéphane Polis, and Jean Winand, 371–96. Leuven: Peeters.
- Labrousse, Audran and Rémy Boucharlat. 1974. “La fouille du palais du Chaour à Suse en 1970 et 1971.” *Cahiers de la Délégation Archéologique Française en Iran* 2: 61–167.
- Ladiry, Daniel. 2013. “The Archaeological Results.” In *The Palace of Darius at Susa: The Great Royal Residence of Achaemenid Persia*, edited by Jean Perrot, 139–208. London: I. B. Tauris.
- Lamb, Trevor and Janine Bourriau, eds. 1995. *Colour: Art and Science*. Cambridge: Cambridge University Press.
- Lambert, Rodolphe and François-Noël Roux. 1998. *Victorien Lottin de Laval, reliefs en plâtre patiné et polychrome, 1845–850*. Paris: Musée du Louvre.
- Landsberger, Benno. 1967. “Über Farben im Sumerisch-Akkadischen.” *Journal of Cuneiform Studies* 21: 139–73.
- Lange, Bente. 1995. *The Colours of Rome*. Copenhagen: Danish Architectural Press.
- Larsen, Mogens T. 1996. *The Conquest of Assyria. Excavations in an Antique Land 1840–1860*. New York: Routledge.
2017. “The Archaeological Exploration of Assyria.” In *A Companion to Assyria*, edited by Eckart Frahm, 583–98. Hoboken, NJ: Wiley.
- Lauer, Jean-Philippe. 1993. “Sur l’emploi et le rôle de la couleur aux monuments du complexe funéraire du Roi Djoser.” *Revue d’Égyptologie* 44: 75–80.
- Laurenzi Tabasso, Marisa and Lorenzo Lazzarini. 2017. “Study of the Finishing Technique of the Bas-Reliefs and Architectural Surfaces.” In *From Palace to Town: Report on the Multidisciplinary Project Carried Out by the Iranian-Italian Joint Archaeological Mission on the Persepolis Terrace (Fars, Iran), 2008–2013*, edited by Alireza Askari Chaverdi and Pierfrancesco Callieri, 108–18. Rome: BraDypUS Communicating Cultural Heritage.
- Laurenzi Tabasso, Marisa and Stefano Ridolfi. 2017a. “Experimental Results of XRF with Portable Equipment.” In *From Palace to Town: Report on the Multidisciplinary Project Carried Out by the Iranian-Italian Joint Archaeological Mission on the Persepolis Terrace (Fars, Iran), 2008–2013*, edited by Alireza Askari Chaverdi and Pierfrancesco Callieri, 87–107. Rome: BraDypUS Communicating Cultural Heritage.
- 2017b. “Portable XRF Survey on Glazed Bricks.” In *From Palace to Town: Report on the Multidisciplinary Project Carried Out by the Iranian-Italian Joint Archaeological Mission on the Persepolis Terrace (Fars, Iran), 2008–2013*, edited by Alireza Askari Chaverdi and Pierfrancesco Callieri, 52–8. Rome: BraDypUS Communicating Cultural Heritage.
- Layard, Austen H. 1849. *Nineveh and Its Remains*. Vols. 1–2. London: John Murray.
1854. *The Nineveh Court in the Crystal Palace*. London: Bradbury & Evans.
- Leatherbarrow, David and Mohsen Mostafavi. 1993. *On Weathering: The Life of Buildings in Time*. Cambridge, MA: MIT Press.
2002. *Surface Architecture*. Cambridge, MA: MIT Press.
- Lecoq, Pierre. 1997. *Les inscriptions de la Perse achéménide*. Paris: Gallimard.
- Lee, Lorna and Stephen Quirke. 2000. “Painting Materials.” In *Ancient Egyptian Materials and Technology*, edited by Paul Nicholson and Ian Shaw, 104–20. Cambridge: Cambridge University Press.
- Le Fur, Daniel. 2016. “Les pigments dans la peinture égyptienne.” In *Pigments et Colorants de l’Antiquité et du Moyen Âge: Teinture, Peinture, Enluminure, études historiques et physico-chimiques*, 181–8. Paris: CNRS Éditions.
- Leicester, Henry. 1971. *Historical Background of Chemistry*. New York: Dover.
- Leith, Ian. 2005. *DeLamotte’s Crystal Palace: A Victorian Pleasure Dome Revealed*. Swindon: English Heritage.
- Leithy, Hisham El-, Christian Lentz, and Daniel von Recklinghausen. 2019. “The Ancient Colours of Esna Return.” *Egyptian Archaeology* 55: 20–4.

- Leka, Evridiki. 2018. "The Adornment of Images. Gilding and Aesthetics of Color on Ancient Sculptures." In *The Countless Aspects of Beauty in Ancient Art* (exhibition catalogue), edited by Maria Lagogianni-Georgakarakou, 417–32 [in Greek]. Athens: Archaeological Receipts Fund.
- Lenclos, Jean-Philippe and Dominique Lenclos. 2004. *Colors of the World: A Geography of Color*. New York: Norton.
- Lentz, Wolfgang and Wolfhard Schlosser. 1968. "Persepolis: ein Beitrag zur Funktionsbestimmung." *Deutscher Orientalistentag* (1968). *Zeitschrift der Deutschen Morgenländischen Gesellschaft* Suppl. 1 3 (17): 957–83.
1971. "Persepolis-weitere Beiträge zur Funktionsbestimmung." *Zeitschrift der Deutschen Morgenländischen Gesellschaft* 121: 254–68.
- Lepinski, Sarah and Susanna McFadden, eds. 2015. *Beyond Iconography: Materials, Methods and Meaning in Ancient Surface Decoration*. Boston: Archaeological Institute of America.
- Lerner, Judith. 1971. "The Achaemenid Relief of Ahura Mazda in the Fogg Art Museum, Cambridge, Massachusetts." *Bulletin of the Asia Institute* 2: 19–35.
1973. "A Painted Relief from Persepolis." *Archaeology* 26: 116–22.
1976. "Polychromy in Achaemenid Relief Sculpture." *Akten des 7. Internationalen Kongresses für Iranische Kunst und Archäologie, München 1976. Archäologische Mitteilungen aus Iran* Erg. Bd. 6: 240–1.
2017. "Ancient Persianisms in Nineteenth Century Iran: The Revival of Persepolitan Imagery under the Qajars." In *Persianism in Antiquity*, edited by Rolf Strootman and Miguel John Versluys, 107–20. Stuttgart: F. Steiner.
- Linders, T. 1984. "The Kandys in Greece and Persia." *Opuscula Atheniensia* 15: 107–14.
- Lippolis, Carlo. 2009. "The Colour in Parthian Nisa: Some Considerations on Polychromy in Sculpture and Architecture in Ancient Mithridatkert (Turkmenistan)." In *Proceedings of the Second International Symposium of the Terracotta Figures and Painted Cultural Relics Preservation and Research*. Abstracts Volume 2009, 553–66. Xi'an, China: n.p.
- Litjens, Stefanie and Kate Seymour, eds. 2017. "Polychrome Sculpture: Tool Marks, Construction Techniques, Decorative Practice and Artistic Tradition. ICOM-CC Interim Meeting, Working Group Sculpture, Polychromy, and Architectural Decoration, Tomar, 28–29 May, 2013." Paris: ICOM-CC. <https://icom.museum/en/ressource/polychrome-sculpture-tool-marks-construction-techniques-decorative-practice-and-artistic-tradition-papers-and-posters-proceedings-of-three-interim-meetings-of-icom-cc-working-group-sculpture-po/>
- Liverani, Paolo. 2005. "La Polychromie de la Statue d' Auguste de Prima porta." *Revue Archéologique* 39: 193–7.
- Liverani, Paolo and Ulderico Santamaria, eds. 2014. *Diversamente Bianco. La Policromia della Scultura Romana*. Rome: Quasar.
- Llewellyn-Jones, Lloyd. 2021. "The Royal 'Gaunaka': Dress, Identity, Status and Ceremony in Achaemenid Iran." In *Masters of the Steppe: The Impact of the Scythians and Later Nomad Societies of Eurasia*, edited by Svetlana Pankova and St John Simpson, 248–57. Oxford: Archaeopress.
- Lloyd, Alan B. 1982. "The Inscription of Udjahorresnet: A Collaborator's Testament." *Journal of Egyptian Archaeology* 68: 166–80.
- Lodging, Darlene. 1974. "A Craft Archive from Ur." PhD diss., University of Pennsylvania.
- Longpérier, Adrien De. 1854. *Notice des antiquités assyriennes, babyloniennes, perses, hébraïques, exposées dans les galeries du Musée du Louvre*. 3rd ed. Paris: Vinchon.
- Loud, Gordon. 1936. *Khorsabad. Part I. Excavations in the Palace and at the City Gate*. Chicago: The Oriental Institute.
- Lucas, Alfred. 1924. *Antiquities. Their Restoration and Preservation*. London: E. Arnold.

- (1926) 1962. *Ancient Egyptian Materials and Industries*. 4th ed. Revised by J. R. Harris. London: E. Arnold.
- Luciani, Marta. 2006. "Palatial Workshops at Qatna." *Baghdader Mitteilungen* 37: 403–30.
- Luft, Paul. 2001. "The Qajar Rock Reliefs." *Iranian Studies* 34 (1–4): 31–49.
- Luschey, Heinz. 1968. "Studien zu dem Darius-Relief in Bisutun." *Archäologische Mitteilungen aus Iran* 1: 63–94.
- Magaloni Kerpel, Diana. 1994. *Metodología para el análisis de la técnica pictórica mural prehispánica: el Templo Rojo de Cacaxtla*. Mexico: Instituto Nacional de Antropología e Historia.
2010. "The Hidden Aesthetic of Red in the Painted Tombs of Oaxaca." *Res: Anthropology and Aesthetics* 57–58 (Spring–Autumn): 55–74.
2011. "Painters of the New World: The Process of Making the Florentine Codex." In *Colors between Two Worlds. The Florentine Codex of Bernardino de Sahagún*, edited by Gerhard Wolf and Joseph Connors, 47–76. Florence: Kunsthistorisches Institut in Florenz, Max-Planck-Institut, Villa I Tatti, the Harvard University Center for Italian Renaissance Studies.
2014. "The Colors of Creation: Materials and Techniques in the Florentine Codex." In *Manuscript Cultures of Colonial Mexico and Peru*, edited by Thomas Cummins, Emily Engel, Barbara Anderson, and Juan Ossio, 175–89. Los Angeles: Getty Research Institute.
2019. "Powerful Words and Eloquent Images." In *The Florentine Codex: An Encyclopedia of the Nahuatl World in Sixteenth-Century Mexico*, edited by Jeanette Favrot Peterson, and Kevin Terraciano, 152–66. Austin: University of Texas Press.
- Mahdizadeh, Sara and Reyhaneh Sadat Shojaei. 2018. "The Involvement of Western Orientalists in Cultural Heritage Affairs During the Pahlavi Era, Iran (1929–1979)." *Journal of Architectural Conservation* 24 (3): 169–84.
- Mahmoudzadeh, A. and Omid Oudbashi. 2004. "Pathological Study on the Bas-Reliefs on the Northern and Eastern Stairways of the Apadana." *Parsa* 1 (1): 121–2.
- Makariou, Sophie. 2003. "Étude d'une scénographie poétique: l'oeuvre d'Ibn al-Jayyab à la tour de la Captive (Alhambra)." *Studia Islamica* 96: 95–107.
- Maktabi, Hadi. 2021. "Carpet as Diplomatic Gifts and Feudal Tribute under the Qajars." In *Revealing the Unseen: New Perspectives on Qajar Art*, edited by Gwenaëlle Fellingier, Carol Guillaume and Melanie Gibson, 140–9. London: Gingko.
- Malley, Shawn. 2012. *From Archaeology to Spectacle in Victorian Britain: The Case of Assyria, 1845–1854*. Farnham: Ashgate.
- Mallouchou-Toufano, Fani. 2006a. "Thirty Years of Anastelosis Work on the Athenian Acropolis." *Conservation and Management of Archaeological Sites* 8 (1): 27–38.
- 2006b. "The Restoration of Classical Monuments in Modern Greece: Historic Precedents, Modern Trends, Peculiarities." *Conservation and Management of Archaeological Sites* 8 (3): 154–73.
- Mallowan, Max. 1966. *Nimrud and Its Remains*. New York: Dodd, Mead.
- Manetta, Consuelo. 2019. "Cultura locale e orizzonte mediterraneo: la pittura funeraria della Tracia tra l'età tardo-classica e la prima età ellenistica." In *Pittori, tecniche, trattati, contesti tra testimonianze e ricezione. Archeologia e arte antica*, edited by Gianfranco Adomato, Eva Falaschi, Alessandro Poggio, 67–96. Milan: LED.
- Maras, Sabrina. 2010. "A Reassessment of Brick Motifs and Brick Building Techniques at Achaemenid Susa." In *The World of Achaemenid Persia*, edited by John Curtis and St John Simpson, 207–20. London: I. B. Tauris.
- Marchetti, Nicolò. 2009. "Texts Quoting Artworks. The Banquet Stele and the Palace Reliefs." *Revue d'assyriologie et d'archéologie orientale* 103: 85–7.
- Marconi, Clemente. 2004. "Kosmos. The Imagery of the Archaic Greek Temple." *RES* 45: 211–22.
2009. "The Parthenon Frieze. Degrees of Visibility." *RES* 55–56: 156–73.
- Marijnissen, Roger. 1996. "Degradation, Conservation and Restoration of Works of Art: Historical Overview." In *Historical and Philosophical Issues in the Conservation of*

- Cultural Heritage*, edited by Nicholas Stanley-Price, M. Kirby Talley Jr. Alessandra Melucco Vaccaro, 275–80. Los Angeles: Getty Conservation Institute. Reprint of *Dégradation, conservation et restauration de l'œuvre d'art* (Brussels: Éditions Arcade, 1967).
- Marincola, Michele. 2004. s.v. “Polychromy.” In *The Encyclopedia of Sculpture*, edited by Antonia Bostroem, 1318–22. New York: Fitzroy Dearborn.
- Marincola, Michele and Lucretia Kargère 2020. *The Conservation of Medieval Polychrome Wood Sculpture: History, Theory and Practice*. Los Angeles: Getty Conservation Institute.
- Martinon-Torres, Marcos. 2002. “Chaîne Opératoire: The Concept and its Applications within the Study of Technology.” *Gallaecia* 21: 29–43.
- Mason, Andrew. 2016. *Ancient Aesthetics*. London: Routledge.
- Mathieu, Bernard, Dimitri Meeks, and Myriam Wissa, eds. 2006. *L'apport de l'Égypte à l'histoire des techniques. Méthodes, chronologie et comparaisons*. Bibliothèque d'Étude 142. Cairo: Institut français d'archéologie orientale.
- Matson, Frederick. 1953. “A Study of Wall Plaster, Flooring, and Bitumen.” In *Persepolis I. Structures, Reliefs, Inscriptions*, edited by Erich F. Schmidt, 285–8. Chicago: University of Chicago Press.
1957. “Analysis of Various Substances from Persepolis.” In *Persepolis II. Contents of the Treasury and Other Discoveries*, edited by Erich F. Schmidt, 125–35. Chicago: University of Chicago Press.
- Matthee, Rudi. 2016. “From Splendour and Admiration to Ruin and Condescension: Western Travelers to Iran from the Safavids to the Qajars.” *Iran* 54: 3–11.
- Matthew, Louisa. 2011. “The Pigment Trade in Europe during the Sixteenth Century.” In *Colors between Two Worlds. The Florentine Codex of Bernardino de Sahagun*, edited by Gerhard Wolf and Joseph Connors, 301–14. Florence: Kunsthistorisches Institut in Florenz, Max-Planck-Institut, Villa I Tatti, the Harvard University Center for Italian Renaissance Studies
- Matthews, Roger, and Hassan Faseli. 2022. *The Archaeology of Iran from the Paleolithic to the Achaemenid Empire*. London: Routledge.
- Matthiae, Paolo, Frances Pinnock, Lorenzo Nigro, and Nicolò Marchetti, eds. 2010. *Proceedings of the 6th International Congress of the Archaeology of the Ancient Near East. 5th–10th May 2009, Rome*. Vol. 1. Wiesbaden: Harrassowitz.
- McCormack, John. 2000. “The Darkening of Cinnabar in Sunlight.” *Mineralium Deposita* 35 (8): 796–8.
- McFerrin, Neville. 2017. “Fabrics of Inclusion: Deep Wearing and the Potentials of Materiality on the Apadana Reliefs.” In *What Shall I Say of Clothes? Theoretical and Methodological Approaches to the Study of Dress in Antiquity*, edited by Megan Cifarelli and Laura Gawlinski, 143–59. Boston: Archaeological Institute of America.
- McGeough, Kevin. 2015. *The Ancient Near East in the Nineteenth Century*. 3 vols. Sheffield: Sheffield Phoenix Press.
2022. *Representations of Antiquity in Film: From Griffith to Grindhouse*. Sheffield: Equinox Publishing.
- McGlinchey, Chris and Karen Trentelman. 2007. “Portable XRF for the Examination of Artists’ Materials and Cultural Heritage.” In *Conservation Science 2007*, edited by Joyce Townsend, Lucia Toniolo, and Francesca Cappitelli, 195–7. London: Archetype Publications.
- McGrath, Thomas. 2000. “Color and the Exchange of Ideas between Patron and Artist in Renaissance Italy.” *The Art Bulletin* 82 (2): 298–302.
- McSweeney, Anna. 2018. “Monumente zum Mitnehmen: Lottin de Lavals Verfahren ambulanter Bauwerkskopien.” In *Bilderfahrzeuge: Aby Warburgs Vermächtnis und die Zukunft der Ikonologie*, edited by Andreas Beyer, Uwe Fleckner, Horst Bredekamp, Gerhard Wolf, 41–53. Berlin: Wagenbach.
- Meadows, Andrew R. 2003. “The Apadana Foundation Deposit (IGCH 1789): Some Clarification.” *Numismatic Chronicle* 163: 342–4.

- Mecquenem, Roland De. 1947. "Contribution à l'étude du palais achéménide de Suse." *Mémoires de la Délégation en Perse* 30: 1–119.
- Meier-Lemgo, Karl. 1933. *Engelbert Kaempfer: 1651–1716. Seltsames Asien (Amoenitates Exoticae)*. Auswahl übersetzt. Detmold: M. Hofbuchhandlung.
- Meissner, Burkhard. 1999. *Die technologische Fachliteratur der Antike: Struktur, Überlieferung und Wirkung technischen Wissens in der Antike, ca. 400 v. Chr.–ca. 500 n. Chr.* Berlin: Akademie Verlag.
- Melucco Vaccaro, Alessandra. 1984. "La policromia nell'architettura e nella plastica antica: Stato della questione." *Ricerche di Storia dell'Arte* 24: 19–32.
1996. "Introduction to 'Part VII: The Idea of Patina.'" In *Historical and Philosophical Issues in the Conservation of Cultural Heritage*, edited by Nicholas Stanley-Price, M. Kirby Talley Jr., and Alessandra Melucco Vaccaro, 366–70. Los Angeles: Getty Conservation Institute.
- Mercier, Emmanuelle and Jana Sanyova. 2012. "Art et techniques de la polychromie romane sur bois dans l'Europe du Nord." *Les Cahiers de Saint-Michel de Cuxa* 43: 125–33.
- Micale, Maria G. 2008. "European Images of the Ancient Near East at the Beginnings of the Twentieth Century." In *Archives, Ancestors, Practices. Archaeology in Light of Its History*, edited by Nathan Schlanger and Jarl Nordbladh, 191–203. New York: Berghahn Books.
- Middleton, Andrew and Ken Uprichard, eds. 2008. *The Nebamun Wall Paintings: Conservation, Scientific Analysis and Display at the British Museum*. London: Archetype Publications.
- Middleton, Robin. 1982. "Hittorf's Polychromy Campaign." In *The Beaux-Arts and Nineteenth Century French Architecture*, edited by Robin Middleton, 174–96. London: Thames & Hudson.
- Miles, George C., ed. 1952. *Archaeologica orientalia in Memoriam Ernst Herzfeld*. Locust Valley, NY: J. J. Augustin.
- Miller, E. 2008a. "Painterly Technique." In *The Nebamun Wall Paintings: Conservation, Scientific Analysis and Display at the British Museum*, edited by Andrew Middleton and Ken Uprichard, 61–70. London: Archetype Publications.
- 2008b. "Conservation of the Paintings." In *The Nebamun Wall Paintings: Conservation, Scientific Analysis and Display at the British Museum*, edited by Andrew Middleton and Ken Uprichard, 75–90. London: Archetype Publications.
- Miller, Margaret C. 1995. "Persians: The Oriental Other." *Source. Notes in the History of Art* 15 (1): 39–44.
1997. *Athens and Persia in the Fifth Century bc: A Study in Cultural Receptivity*. Cambridge: Cambridge University Press.
- Miller, Naomi F. and Kamyar Abdi, eds. 2003. *Yeki Bud, Yeki Nabud. Essays on the Archaeology of Iran in Honor of William M. Sumner*. Los Angeles: Cotsen Institute of Archaeology at UCLA.
- Mills, Kristoffer and Laurie Rush. 2017. "Integration of Cultural Property Protection into a Decisive Action Training Exercise." *Military Review* (November–December).
- Miri, Negin. 2022. "Color and Polychromy in Sasanian Rock Reliefs." [in Persian] *Journal of Archaeological Studies* 14 (1): 155–81.
- Mitchell, Lynette and Charles Melville, eds. 2012. *Every Inch a King: Comparative Studies on Kings and Kingship in the Ancient and Medieval Worlds*. Leiden: Brill.
- Mitchell, Terence C. 2000. "The Persepolis Sculptures in the British Museum." *Iran* 38: 49–56.
- Mohammadi, Parisa and Wolfgang E. Krumbein. 2008. "Biodeterioration of Ancient Stone Materials from the Persepolis Monuments (Iran)." *Aerobiologia* 24: 27–33.
- Momenzadeh, Morteza. 2002. "Mining Archaeology in Iran. An Ancient Gold Mining Site of Zartorosht (SW-Jiroft, SE-Iran)." *Metalla (Bochum)* 9 (1): 47–53.
2004. "Metallic Mineral Resources of Iran, Mined in Ancient Times." In *Persians*

- Antike Pracht. Bergbau, Handwerk, Archäologie*, edited by Thomas Stöllner, Rainer Slotta, and Abdolrasool Vatandoust, 8–21. Bochum: Deutsches Bergbau-Museum.
- Monteix, Nicolas. 2012. “Caius Lucretius [...], marchand de couleurs de la rue des fabricants de courroies. Réflexions critiques sur les concentrations de métiers à Rome.” In *Quartiers artisanaux en Grèce ancienne: une perspective méditerranéenne*, edited by Arianna Esposito and Giorgos Sanidas, 333–52. Villeneuve d’Ascq: Presses Universitaires du Septentrion.
- Moorey, Peter Roger S. 1985. *Materials and Manufacture in Ancient Mesopotamia: The Evidence of Art and Archaeology: Metals and Metalwork, Glazed Materials and Glass*. Oxford: B.A.R.
1994. *Ancient Mesopotamian Materials and Industries: The Archaeological Evidence*. Oxford: Oxford University Press.
- Moortgat, Anton. 1959. *Alt-Vorderasiatische Malerei*. Berlin: Safari-Verlag.
- Morgan, Jacques de. 1905. Découverte d’une sépulture achéménide. *Mémoires de la Délégation Perse* 8: 29–58.
- Morgan, Jacques de, Gustave Jéquier, and Georges Lampre 1900. *Fouilles à Suse en 1897–1898 et 1898–1899*. Paris: Leroux.
- Morgenstern, Laure. 1939. “Mural Painting.” In *A Survey of Persian Art*. Vol. 5, edited by Arthur Upham Pope and Phyllis Ackerman, 1365–90. London: Oxford University Press.
- Mostafavi, S. M. T. 1978. *The Land of Pars. The Historical Monuments and the Archaeological Sites of the Province of Fars*. Translated by R. N. Sharp. Chippenham: Picton.
- Motaghedi, K. 2019. Vibrant Qajar Colours. The Evolution of Seven Colours Tiles. *Gilgamesh Art Magazine* 7 (Autumn): 59–65.
- Mousavi, Ali. 1996. “Early Archaeological Adventures and Methodological Problems in Iranian Archaeology: The Evidence from Susa.” *Iranica Antiqua* 31: 1–17.
2002. “Persepolis in Retrospect: History of Discovery and Archaeological Exploration at the Ruins of Ancient Parseh.” In “Medes and Persians: Reflections on Elusive Empires,” edited by Margaret Cool Root. *Ars Orientalis* 32: 209–51.
2005. “Ernst Herzfeld, Politics, and Antiquities Legislation in Iran.” In *Ernst Herzfeld and the Development of Near Eastern Studies, 1900–1950*, edited by Ann Gunter and Stefan Hauser, 445–75. Leiden: Brill.
2012. *Persepolis: Discovery and Afterlife of a World Wonder*. Boston: De Gruyter.
- Mousavi, Ali and Nader Nasiri-Moghaddam. 2009. “Les hauts et les bas de l’archéologie en Iran.” *La Pensée de midi* 27: 137–43.
- Mousavi, Ali and Touraj Daryaei. 2021. “Parsa and Uja.” In *A Companion to the Achaemenid Persian Empire*, edited by Bruno Jacobs and Robert Rollinger, 485–94. Hoboken, NJ: Wiley.
- Mozaffari, Ali, ed. 2014. *World Heritage in Iran: Perspectives on Pasargadae*. Farnham: Ashgate.
- Muller, Béatrice. 2019. “Les antécédents orientaux des stucs architecturaux.” In *Stucs d’Orient. Traditions orientales et cultures hellénisées*, edited by Jacqueline Dentzer-Feydy, Anne-Marie Guimier-Sorbets, and Christiane Delplace, 15–22. Beirut: Presses de l’Ifpo.
- Mulliez, Maud, ed. 2019. *Restituer les couleurs. Le rôle de la restitution dans les recherches sur la polychromie, en sculpture, architecture et peinture murale. Actes du colloque 29–30 novembre et 1er décembre 2017*. Bordeaux: Ausonius éditions.
- Muñoz-Viñas, Salvador. 2005. *Contemporary Theory of Conservation*. Oxford: Butterworth-Heinemann.
- Muscarella, Oscar W. 1981. *Ladders to Heaven: Art Treasures from Lands of the Bible. A Catalogue of Some of the Objects In the Collection Presented by Elie Borowski to the Lands of the Bible Archaeology Foundation and Displayed in the Exhibition Ladders to Heaven: Our Judeo-Christian Heritage 5000 bc–ad 500, Held at the Royal Ontario Museum June 23–October 28, 1979*. Toronto: McClelland and Stewart.
- Muscarella, Oscar W., Annie Caubet, and F. Tallon. 1992. “Susa in the Achaemenid

- Period, circa 559–330 BC.” In *The Royal City of Susa. Ancient Near Eastern Treasures in the Louvre*, edited by Prudence O. Harper, Joan Aruz, and F. Tallon, 215–52. New York: Metropolitan Museum of Art.
- Musche, Brigitte. 2006. “Überlegungen zur Architektur der achämenidischen Felsengräber von Naqsh-e Rostam.” *Archäologische Mitteilungen aus Iran und Turan* 38: 325–45.
- Müseler, Wilhelm. 2005–6. “Die sogenannten dunklen Jahrhunderte der Persis: Anmerkungen zu einem lange vernachlässigten Thema.” *Jahrbuch für Numismatik und Geldgeschichte* 55–6: 75–103.
- Nadali, Davide. 2013. “Invented Space: Discovering Near Eastern Architecture Through imaginary representations and constructions.” In *Time and History in the Ancient Near East: Proceedings of the 56th Rencontre Assyriologique Internationale at Barcelona*, edited by Lluís Feliu, A. Millet Alba, and Joaquín Sanmartín, 391–404. Winona Lake, IN: Eisenbrauns.
- Nadali, Davide and Maria G. Micale, eds. 2015. *How Do We Want the Past to Be? On Methods and Instruments of Visualizing the Ancient Reality*. Piscataway, NJ: Gorgias Press.
- Nagel, Alexander. 2010. “Colors, Gilding and Painted Motifs in Persepolis: Approaching the Polychromy of Achaemenid Persian Architectural Sculpture, c. 520–330 BCE.” PhD thesis, University of Michigan.
2013. “Color and Gilding in Achaemenid Architecture and Sculpture.” *The Oxford Handbook of Ancient Iran*, edited by Daniel T. Potts, 596–621. Oxford: Oxford University Press.
2014. “Color in Ancient Near Eastern and Egyptian Sculpture.” In *Transformations. Classical Sculpture in Colour*, edited by Jan Stubbe Østergaard and Anne Marie Nielsen, 130–45. Copenhagen: Ny Carlsberg Glyptotek.
- 2018a. “Painters and Painters’ Workshops in the Ancient Near East: Some Considerations and a Reassessment.” In *L’Orient est son jardin. Hommage à Rémy Boucharlat*, edited by Sébastien Gondet and Ernie Haerink, 377–86. Leuven: Peeters.
- 2018b. “Review of A. Mozaffari ed. *World Heritage in Iran: Perspectives on Pasargadae (Heritage, Culture and Identity)*.” *Iranian Studies* 51 (1): 161–70.
2019. “Research on Color Matters: Towards a Modern Archaeology of Ancient Polychromies.” In *Science in Color: Visualizing Achromatic Knowledge*, edited by Bettina Bock von Wülfingen, 51–64. Berlin: De Gruyter.
2020. “Preserving the Achaemenid Persian Legacy: Aspects of Conservation, Technology, Polychromy, and Material Culture in Persepolis.” In *The Art of Empire in Achaemenid Persia: Studies in Honour of Margaret Cool Root*. Achaemenid History 16, edited by Elspeth Dusinberre, Mark Garrison, and Wouter F. Henkelman, 113–36. Leiden: Netherlands Institute for the Near East.
- 2021a. “Techniques of Art and Architecture.” In *A Companion to the Achaemenid Persian Empire*, edited by Bruno Jacobs and Robert Rollinger, 1355–73. Hoboken, NJ: Wiley.
- 2021b. “The Mineral Universe of Elamite Susa and Achaemenid Persepolis.” In *Paleopersepolis: Environment, Landscape and Society in Ancient Fars*, edited by Silvia Balatti, Hilmar Klinkott, and Josef Wiesehöfer, 59–76. Stuttgart: F. Steiner.
- 2021c. “Achaemenid Persian Art and Architecture in the Vorderasiatisches Museum in Berlin.” In *Achemenet. Vingt ans après*. Persika 21, edited by Damien Agut-Labordère, Rémy Boucharlat, Francis Joannès, Amélie Kuhrt, and Matthew W. Stolper, 257–75. Leuven: Peeters.
2022. “A Flower for Brigitte from Susa (via Washington, DC): Ongoing Research on Achaemenid Persian Glazed Bricks and Polychromies in the Smithsonian Institution.” In *Hommage à Brigitte Bourgeois. Grande prêtresse des couleurs*, edited

- by Marie Lionnet-de Loitière and Violaine Jeammet, 80–5. Paris: Centre de recherche et de restauration des musées de France. (privately published)
- Nagel, Alexander and Hassan Rahsaz. 2010. “Colouring the Dead: New Investigations on the History and the Polychrome Appearance of the Tomb of Darius I at Naqsh-e-Rostam, Fars.” In *Death and Burial in Arabia and Beyond: Multidisciplinary Perspectives*, edited by Lloyd R. Weeks, 289–98. Oxford: Archaeopress.
- Nagel, Alexander and Rachael Woody. 2014. “Excavations in the Archive. An Update on the Ernst Herzfeld Online Resources at the Freer|Sackler in Washington, DC.” In *A Hundred Years of Excavations in Samarra*, edited by Julia Gonnella and Barbara Finster, 20–9. Wiesbaden: Reichert.
- Nasiri-Moghaddam, Nader. 2002. “Les missions archéologiques françaises et la question des antiquités en Perse (1884–1914).” PhD diss., Sorbonne nouvelle, Université de Paris III.
2004. *L’archéologie française en Perse et les antiquités nationales 1884–1914*. Paris: Connaissances et Savoirs.
- Naster, Paul. 1974. “Indices de peinture des reliefs à Persépolis.” *Orientalia Lovaniensia Periodica* 5: 47–51.
- Nees, Lawrence. 2011. “Blue behind Gold. The Inscription of the Dome of the Rock and Its Relatives.” In *And Diverse Are Their Hues. Color in Islamic Art and Culture*, edited by Jonathan Bloom and Sheila Blair, 152–73. New Haven, CT: Yale University Press.
- Nehme, L., D. Al-Talhi, and F. Villeneuve. 2012. “Hegra of Arabia Felix.” In *Roads of Arabia. Archaeology and History of the Kingdom of Saudi Arabia*, edited by A. Al Ghabban, 286–307. Washington, DC: Smithsonian Institution.
- Neils, Jenifer. 2016. “Color and Carving: Architectural Decoration in Mainland Greece.” In *A Companion to Greek Architecture*, edited by Margaret M. Miles, 164–77. Hoboken, NJ: Wiley.
- Neri, Elisabetta, Nesrine Nasr, and David Strivay. 2022. “Ancient Restoration in Roman Polychromy: Detecting Aesthetic Changes?” *Heritage* 5: 829–48. <https://doi.org/10.3390/heritage5020045>
- Neumann, Kiersten and Alison Thomason, eds. 2021. *The Routledge Handbook of the Senses in the Ancient Near East*. New York: Routledge.
- Newman, Richard and Susana Halpine. 2001. “The Binding Media of Ancient Egyptian Painting.” In *Colour and Painting in Ancient Egypt*, edited by Vivian W. Davies, 22–32. London: British Museum Press.
- Newton, Charles. 1862–3. *A History of Discoveries at Halicarnassus*. London: Day.
- Nichols, Kate. 2015. *Greece and Rome at the Crystal Palace: Classical Sculpture and Modern Britain, 1854–1936*. Oxford: Oxford University Press.
- Nicholson, Paul and Ian Shaw, eds. 2000. *Ancient Egyptian Materials and Technology*. Cambridge: Cambridge University Press
- Nickerson, Janet. 1977. “Malyan Wall Paintings.” *Expedition* 19: 2–6.
- Niknami, Kamal Aldin. 2000. *Methodological Aspects of Iranian Archaeology. Past and Present*. British Archaeological Reports 852. Oxford: Archaeopress.
- Nunn, Astrid. 1988. *Die Wandmalerei und der glasierte Wandschmuck im alten Orient*. Leiden: Brill.
2016. “Colorful Garments of Mesopotamian Stone Statues.” In *Essays in Global Color History. Interpreting the Ancient Spectrum*, edited by Rachael Goldman, 49–58. Piscataway, NJ: Gorgias Press.
2022. “Couleurs et lumière sur les statues mésopotamiennes.” In *Image and Identity in the Ancient Near East: Papers in Memoriam Pierre Amiet*, edited by Laura Battini. 101–14. Oxford: Archaeopress.
- Nunn, Astrid, Barbara Jändl, and Rupert Gebhard. 2015. “Polychromy on Mesopotamian Stone Statues. Preliminary Report.” *Studia Mesopotamica* 2: 187–206.
- Nunn, Astrid and Heinrich Piening, eds. 2020. *Mesopotamian Sculpture in Colour*. Gladbeck: PeWe-Verlag.

- Nylander, Carl. 1965. "Old Persian and Greek Stone Cutting and the Chronology of Achaemenian Monuments: Achaemenian Problems I." *American Journal of Archaeology* 69: 49–55.
1968. "Foreign Craftsmen in Achaemenid Persia." In *The Memorial Volume of the Vth International Congress of Iranian Art and Archaeology: Tehran, Isfahan, Shiraz 11th–18th April 1968*, edited by Akbar Tajvidi and Muhammad Yousef Kiani, 311–8. Tehran: Ministry of Culture and Arts.
1970. *Ionians at Pasargadae: Studies in Old Persian Architecture*. Uppsala: Almqvist & Wiksell.
1974. "Mason's Marks in Persepolis: A Progress Report." In *Proceedings of the 2nd Annual Symposium on Archaeological Research in Iran*, edited by Firouz Bagherzadeh, 216–22. Tehran: Iranian Centre for Archaeological Research.
2006. "Stones for Kings. Stone Working in Ancient Iran." In *Architetti, capomastri, artigiani. L'organizzazione dei cantieri e della produzione artistica nell'Asia ellenistica. Studi offerti a Domenico Faccenna nel suo ottantesimo compleanno*, edited by Pierfrancesco Callieri, 121–36. Rome: Istituto italiano per l'Africa e l'Oriente.
- Oddy, Andrew. 2002. "The Conservation of Marble Sculptures in the British Museum before 1975." *Studies in Conservation* 47 (3): 145–54.
- Ohnesorg, Aenne. 1991. "Herstellung und Bemalung von Marmordächern des 6. Jhs.v.Chr." In *Bautechnik der Antike*, edited by Adolf Hoffmann, 172–7. Mainz: Zabern.
- Oppenheim, A. Leo. 1949. "The Golden Garments of the Gods." *Journal of Near Eastern Studies* 8: 172–93.
- Orbasli, Aylin. 2007. *Architectural Conservation: Principles and Practice*. Oxford: Blackwell Science.
- Orlandos, Anastasios. 1976–8. *The Architecture of the Parthenon*. 3 vols. [in Greek] Athens: Archaeological Society at Athens.
- Oudbashi, Omid and Morteza Hessari. 2021. "A 'Western' imported Technology: An Analytical Study of Achaemenid Egyptian Blue objects." *Journal of Cultural Heritage* 47, January–February 2021, 246–256.
- Oudbashi, Omid, Atefeh Shekofte, and Hamid Fadaei. 2022. "An Exploration of a 2500-Year-Old Monument: A Reappraisal of the Achaemenian Decorative Flooring Plasters in Persepolis World Heritage Site (ca. 550–330 BCE)." *Studies in Conservation* <https://doi.org/10.1080/00393630.2022.2062562>
- Ouseley, William. (1819–23) 1921. *Travels in Various Countries of the East, Particularly Persia*. London: Cadell & Davies.
- Owen, Gwil and Barry Kemp 1994. "Craftsmen's Work Patterns in Unfinished Tombs at Amarna." *Cambridge Archaeological Journal* 4 (1): 121–9.
- Paccard, Alexis. 1982. "Mémoire explicatif de la Restauration du Parthénon par Alexis Paccard-Manuscript 241, 1845." In *Paris–Rome–Athènes. Le voyage en Grèce des architectes français aux XIXe et XXe siècles*, edited by Marie-Christine Hellmann and Philippe Fraisse, 351–68. Paris: Ecole nationale supérieure des Beaux-Arts.
- Paetz gen. Schieck, Annette. 2009. "Alexander der Große und das Ornat des persischen Großkönigs." In *Alexander der Grosse und die Öffnung der Welt. Asiens Kulturen im Wandel*, edited by Svend Hansen, Alfried Wiczorek, and Michael Tellenbach, 104–9. Regensburg: Schnell & Steiner.
- Pagès-Camagna, Sandrine and Dietrich Raue. 2016. "Coloured Materials Used in Elephantine: Evolution and Continuity from the Old Kingdom to the Roman Period." *Journal of Archaeological Science. Reports* 7: 662–7.
- Pakbaz, R. 2000. *Iranian Painting: From the Prehistoric Era to the Present Day*. [in Persian] Tehran: n.p.
- Paley, Samuel. 1976. *King of the World: Ashurnasirpal II of Assyria 883–859 B.C.* New York: Brooklyn Museum.
- Paley, Samuel and Elizabeth Hendrix. 2008. "Creating a Virtual Model of the Northwest Palace." In *New Light on Nimrud. Proceedings of the Nimrud Conference 11th–13th March 2002*, edited by John Curtis, Henrietta McCall, and

- Dominique Collon, 195–207. London: British Institute for the Study of Iraq.
- Palme, Bernhard and Angelika Zdiarsky. 2012. *Gewebte Geschichte. Stoffe und Papyri aus dem spätantiken Ägypten*. Vienna: Phoibos.
- Panckoucke, publisher. 1809–28. *Description de l'Égypte ou recueil des observations et des recherches, qui ont été faites en Égypte pendant l'expédition de l'armée française*. <http://descegy.bibalex.org/>
- Panzarelli, Roberta, Eike Schmidt, and Kenneth Lappatin, eds. 2008. *The Color of Life: Polychromy in Sculpture from Antiquity to the Present*. Los Angeles: Getty Research Institute.
- Paone, Rosario. 1977. “La tutela dei beni culturali in Iran. Storia e cronache.” *Restauro. Quaderni di restauro dei monumenti e di urbanistica dei centri antichi* 29: 7–62.
- Papet, Édouard. 2018. *En couleurs. La sculpture polychrome en France, 1850–1910*. Vanves: Musée d'Orsay.
- Park, David. 2002. “The Polychromy of English Medieval Sculpture.” In *Wonder. Painted Sculpture from Medieval England*, edited by Stacy Boldrick, David Park, and Paul Williamson, 30–56. Leeds: Henry Moore Institute.
- Parker, J. 2008. “Analysis of Materials Used in Previous Conservation Treatments.” In *The Nebamun Wall Paintings: Conservation, Scientific Analysis and Display at the British Museum*, edited by Andrew Middleton and Ken Uprichard, 71–4. London: Archetype Publications.
- Paterson, Ian. 2003. *A Dictionary of Colour*. London: Thorogood.
- Paton, James M., Lacey Caskey, Harold Fowler, and Gorham Stevens. 1927. *The Erechtheum*. Cambridge, MA: Harvard University Press.
- Payne, Elizabeth. 2008. “The Craftsmen of the Neo-Babylonian Period: A Study of the Textile and Metal Workers of the Eanna Temple.” Unpublished PhD diss., Yale University.
- Pentcheva, Biseva. 2006. “The Performative Icon.” *The Art Bulletin* 88 (4): 631–55.
2010. *The Sensual Icon: Space, Ritual and the Senses in Byzantium*. University Park, PA: Penn State University Press.
- Perrot, Georges and Charles Chipiez 1892. *A History of Art in Persia, Phrygia, Lydia, Caria and Lycia*. London: Chapman and Hall.
- Perrot, Jean. 1997. “Der Palast von Susa.” In *Land der Bibel. Ausstellungskatalog Wien, Kunsthistorisches Museum*. Vol. 1, edited by Wilfried Seipel, 170–85. Vienna: Kunsthistorisches Museum.
2013. *The Palace of Darius at Susa. The Great Royal Residence of Achaemenid Persia*. London: I. B. Tauris. Originally published as *Le palais de Darius à Suse. Une résidence royale sur la route de Persépolis à Babylone*. (Dijon: Editions Faton, 2008).
- Petersen, Eugen. 1889. “Vogelabwehr.” *Athenische Mitteilungen*: 233–9.
- Petit, Lucas and Daniele Morandi Bonacossi, eds. 2017. *Nineveh. The Great City. Symbol of Beauty and Power*. Papers on Archaeology of the Leiden Museum of Antiquities. Leiden: Sidestone Press.
- Petzet, Michael, ed. 2003. *Historische Architekturoberflächen Kalk-Putz-Farbe; Internationale Fachtagung des Deutschen Nationalkomitees von ICOMOS und des Bayerischen Landesamtes für Denkmalpflege München, 20.–22. November 2002 = Historical architectural surfaces = International Council on Monuments and Sites. Arbeitshefte des Bayerischen Landesamtes für Denkmalpflege* 117. Munich: Bayerisches Landesamt für Denkmalpflege.
- Pezard, Maurice and Edmund Pottier 1913. *Les antiquités de la Susiane: Mission J. de Morgan*. Paris: Leroux.
1926. *Catalogue des antiquités de Susiane (Mission J. de Morgan)*. 2nd ed. Paris: Musées nationaux, Palais du Louvre.
- Philippot, Paul. 1970. “La restauration des sculptures polychromes.” *Studies in Conservation* 15 (4): 248–52.
- Phillips, J. Peter. 2002. *The Columns of Egypt*. Manchester: Peartree Publishing.
- Phillips, Samuel. 1854. *Guide to the Crystal Palace and Park*. London: Bradbury & Evans.
- Piggott, Jan. 2004. *Palace of the People: The Crystal Palace at Sydenham 1854–1936*. London: C. Hurst.

- Pigott, Vincent. 1999a. "The Development of Metal Production on the Iranian Plateau: An Archaeometallurgical Perspective." In *The Archaeometallurgy of the Asian Old World*. MASCA Research Papers in Science and Archaeology 16, edited by Vincent Pigott, 73–106. Philadelphia: Museum University of Pennsylvania.
- 1999b. "A Heartland of Metallurgy. Neolithic/Chalcolithic Metallurgical Origins on the Iranian Plateau." In *The Beginnings of Metallurgy. Proceedings of an International Conference in Bochum 1995*. Der Anschnitt, Beiheft 9, edited by Andreas Hauptmann, Ernst Pernicka, Thilo Rehren, and Ü. Yalçın, 107–20. Bochum: Deutsches Bergbau-Museum.
- ed. 1999c. *The Archaeometallurgy of the Asian Old World*. MASCA Research Papers in Science and Archaeology 16. Philadelphia: Museum University of Pennsylvania.
2004. "On the Importance of Iran in the Study of Prehistoric Copper-Base Metallurgy." In *Persiens Antike Pracht. Bergbau, Handwerk, Archäologie*, edited by Thomas Stöllner, Rainer Slotta, and Abdolrasool Vatandoust, 28–43. Bochum: Deutsches Bergbau-Museum.
- Pilipko, Victor. 2002. "The Second Helmeted Head from old Nisa." *Iran* 40: 273–6.
- Pillet, Maurice. 1914. *Le palais de Darius Ier à Suse*. Paris: [P. Geuthner].
- Pipili, Maria. 2000. "Wearing Another Hat: Workmen in Town and Country." In *Not the Classical Ideal: Athens and the Construction of the Other in Greek Art*, edited by Beth Cohen, 153–79. Leiden: Brill.
- Pisani, Salvatore. 2003. "Die Monumente sind durch die Barbaren monochrom geworden." In *Gottfried Semper (1803–1879): Architektur und Wissenschaft*, edited by Winfried Nerdinger and Werner Oechslin, 109–15. Zurich: gta Verlag.
2021. *Architektenschmiede Paris: Die Karriere des Jakob Ignaz Hittorff*. Berlin: De Gruyter Oldenbourg.
- Place, Victor. 1867–70. *Ninive et l'Assyrie. Avec des essais de restauration par Félix Thomas*. Paris: Imprimerie impériale.
- Pliny the Elder. 1938. *Natural History*. With an English translation by H. Rackham. Cambridge, MA: Harvard University Press and W. Heinemann.
- Plutarch. 1948. *Lives*. With an English translation by B. Perrin. Cambridge, MA: Harvard University Press and W. Heinemann.
- Pollard, A. Mark and Peter Bray. 2007. "A Bicycle Made for Two? The Integration of Scientific Techniques into Archaeological Interpretation." *Annual Revue of Anthropology* 36: 245–59.
- Pollitt, Jerome J. 1974. *The Ancient View of Greek Art: Criticism, History and Terminology*. New Haven, CT: Yale University Press.
- Polosmak, Natalya. 2001. "Zur Kleidung der Pazyryk Bevölkerung aus Ukok, Suedaltaj." In *Migration und Kulturtransfer. Der Wandel vorder- und zentralasiatischer Kulturen im Umbruch vom 2. zum 1. vordchristlichen Jahrtausend*, edited by Ricardo Eichmann and Hermann Parzinger, 101–26. Bonn: Habelt.
- Polybius. 1925. *The Histories*. Books 9–15. Greek text with English translation by W. R. Paton. Cambridge, MA: Harvard University Press and W. Heinemann.
- Pope, Arthur Upham and Phyllis Ackerman. 1938. *A Survey of Persian Art from Prehistoric Times to the Present*. London: Oxford University Press.
- Portal, Jane, ed. 2007. *The First Emperor: China's Terracotta Army*. London: British Museum Press.
- Porter, Robert Ker. 1821. *Travels in Georgia, Persia, Armenia, Ancient Babylonia, and etc. during the Years 1817, 1818, 1819, and 1820*. London: Longman, Hurst, Rees, Orme, and Brown.
- Portman, Adolf and Rudolf Ritsema, eds. 1974. *The Realms of Colors*. Leiden: Brill.
- Posamentir, Richard. 2006. *Bemalte attische Grabsteine klassischer Zeit*. Studien zur antiken Malerei und Farbgebung 6. Munich: Biering & Brinkmann.
- Posener, Georges. 1936. *La Première Domination Perse en Egypte*. Cairo: L'Institut Français d'Archéologie Orientale.

- Potts, Daniel T. 1999. *The Archaeology of Elam: Formation and Transformation of an Iranian State*. Cambridge: Cambridge University Press. (Rev. ed. 2015).
2008. "The Persepolis Fortification Texts and the Royal Road: Another Look at the Fahliyan Area." In *L'archive des fortifications de Persépolis. État des questions et perspectives de recherches. Actes du colloque organisé au Collège de France, 3-4 novembre 2006*. Persika 12, edited by Pierre Briant, Wouter F. Henkelman, and Matthew W. Stolper, 275-301. Paris: De Boccard.
2011. "A Note on the Limits of Anšan." In *Elam and Persia*, edited by Javier Alvarez-Mon and Mark Garrison, 35-43. Winona Lake, IN: Eisenbrauns.
- ed. 2013. *The Oxford Handbook of Ancient Iran*. Oxford: Oxford University Press.
- Potts, Daniel T., Alireza Askari Chaverdi, Iona Mcrae, K. Alamdari, Amanada Dusing, Javad Jaffari, T. M. Ellicott, A. Setoudeh, A. Lashkari, S. Ameli Rad, and Afshin Yazdani. 2009. "Further Excavations at Qaleh Kali (MS46) by the Joint ICAR-University of Sydney Mamasani Expedition: Results of the 2007/2008 Season." *Iranica Antiqua* 44: 207-82.
- Potts, Daniel T., K. Roustaei, Cameron A. Petrie, and Lloyd R. Weeks, eds. 2009. *The Mamasani Archaeological Project: Stage One. A Report on the First Two Seasons of the ICAR-University of Sydney Expedition to the Mamasani District, Fars Province, Iran by Members of the Mamasani Archaeological Project Team*. 2nd ed. Oxford: Archaeopress.
- Price, David. 2016. *Weaponizing Anthropology*. Petrolia, CA: AK Press.
- Purinton, Nancy and Mark Watters. 1991. "A Study of the Materials Used by Medieval Persian Painters." *Journal of the American Institute for Conservation* 30 (2): 125-44.
- Pye, Elizabeth. 2001. *Caring for the Past: Issues in Conservation for Archaeology and Museums*. London: James & James.
2009. "Archaeological Conservation: Scientific Practice or Social Process." In *Conservation: Principles, Dilemmas and Uncomfortable Truths*, edited by Alison Richmond and Alison Bracker, 129-38. Oxford: Butterworth-Heinemann.
2017. "Issues in Practice: Conservation Procedures." In *Museums and Archaeology*, edited by Robin Skeates, 109-41. London: Routledge.
- Qaheri, Sepideh. 2020. *Catalogue d'objets égyptiens et égyptianisants d'époque achéménide conservés en Iran*. Leuven: Peeters.
- Quillien, Louise. 2020. "The Economic Role of Coloured Textiles in Babylonia (1st Millennium BC)." In *The Value of Colour: Material and Economic Aspects in the Ancient World*, edited by Shiyanthi Thavapalan and David Warburton, 201-30. Berlin: EditionTopoi.
- Quirke, Stephen. 2018. "Languages of Artists: Closed and Open Channels." In *The Art of Making in Ancient Egypt*, edited by Gianluca Miniaci, Juan Carlos Moreno Garcia, and Stephen Quirke, 175-96. Leiden: Sidestone Press.
- Randall, Richard H. 1953. "The Erechtheum Workmen." *American Journal of Archaeology* 57: 199-210.
- Rassam, Hormuzd. 1897. *Ashur and the Land of Nimrod*. Cincinnati: Curtis & Jennings.
- Rathgen, Friedrich. 1898. *Die Konservierung von Altertumsfinden: mit Berücksichtigung ethnographischer und kunstgewerblicher Sammlungsgegenstände*. Berlin: De Gruyter. Translated by George A. Auden as *The Preservation of Antiquities. A Handbook for Curators* (Cambridge: Cambridge University Press, 1906).
- Razmjou, Shahrokh. 2002a. "Traces of Paint on the Statue of Darius." *ARTA* 2002 (3): 1-2.
- 2002b. "Assessing the Damage: Notes on the Life and Demise of the Statue of Darius from Susa." In "Medes and Persians: Reflections on Elusive Empires," edited by Margaret Cool Root. *Ars Orientalis* 32: 81-104.
2005. "Ernst Herzfeld and the Study of Graffiti at Persepolis." In *Ernst Herzfeld and the Development of Near Eastern Studies, 1900-1950*, edited by Ann Gunter and Stefan Hauser, 315-41. Leiden: Brill.

2010. "Persepolis: A Reinterpretation of Palaces and Their Function." In *The World of Achaemenid Persia*, edited by John Curtis and St John Simpson, 231–45. London: I. B. Tauris.
- Razmjou, Shahrokh, Michael Tite, Andrew Shortland, Marion Jung, and Andreas Hauptmann. 2004. "Glasierte Ziegel der Achaemenidischen Periode." In *Persiens Antike Pracht. Bergbau, Handwerk, Archäologie*, edited by Thomas Stöllner, Rainer Slotta, and Abdolrasool Vatandoust, 382–93. Bochum: Deutsches Bergbau-Museum.
- Reade, Julian E. 1979. "Assyrian Architectural Decoration: Techniques and Subject Matter." *Baghdader Mitteilungen* 10: 17–50.
1983. *Assyrian Sculpture*. London: British Museum Publications.
2000. "Restructuring the Assyrian Sculptures." In *Variatio delectat, Iran und der Westen: Gedenkschrift für Peter Calmeyer*, edited by Reinhard Dittmann, 607–26. Münster: Ugarit-Verlag.
2008. "Nineteenth Century Nimrud: Motivation, Orientation, Conservation." In *New Light on Nimrud: Proceedings of the Nimrud Conference 11th–13th March 2002*, edited by John Curtis, Heather McCall, Dominique Collon, and Laila al-Gailani Werr, 1–21. London: British Institute for the Study of Iraq.
- Rees-Jones, Stephen G. 1990. "Early Experiments in Pigment Analysis." *Studies in Conservation* 35 (2): 93–101.
- Rehm, Ellen. 2018. *Wertvolle Kopien. Gipsabgüsse altorientalischer Denkmäler in Deutschland*. Münster: Zaphon.
2021. "Die Abklatsche aus Persepolis und Pasargadae von Friedrich Sarre im Museum fuer Islamische Kunst in Berlin." *Mitteilungen der Deutschen Orient Gesellschaft* 153: 27–53.
2022. "Der 'Nineveh Court' in Sydenham, der Besuch des Berliner Generaldirektors Ignaz von Olfers und seine Folgen." In *Von Syrien bis Georgien: durch die Steppen Vorderasiens. Festschrift für Felix Blocher anlässlich seines 65. Geburtstages*, edited by Michael Herles, Claudia Beuger, Jörg Becker, and Simone Arnhold, 497–524. Münster: Zaphon.
- Rehm, Robin. 2019. "Der Parthenon in Rot. Sempers Farbenarchäologie." In *Polychromie und Wissen*, edited by Uta Hassler, 40–59. Munich: Hirmer.
- Reiche, Ina, Katharina Mueller, Marie Alberic, Oliver Scharf, Andrea Wähning, Aniouar Bjeoumikhov, Martin Radtke, and Rolf Simon. 2013. "Discovering Vanished Paints and Naturally Formed Gold Nanoparticles on 2800 Years Old Phoenician Ivories Using SR-FF-MicroXRF with the Color X-Ray Camera." *Analytical Chemistry* 85 (12): 5857–66.
- Reinhold, Meyer. 1970. *The History of Purple as a Status Symbol in Antiquity*. Brussels: Latomus.
- Reuterswärd, Patrik. 1958. *Studien zur Polychromie der Plastik*. Vol. 1, *Ägypten*. Stockholm: Almqvist & Wiksell.
1960. *Studien zur Polychromie der Plastik*. Vol. 2, *Griechenland und Rom*. Stockholm: Svenska Bokförlaget.
- Reza Garosi, G. 2009. *Die Kolossal-Statue Sapurs I. im Kontext der Sasanidischen Plastik*. Mainz: Zabern.
- Rezaei, Iraj. 2021. "Qizqapan: A Rock-Cut Tomb from the Median, Achaemenid, Seleucid or Parthian Period?" *Iraq* 83: 167–82.
- Rhoussopoulos, D. A. 1911. "On the Cleaning and Preservation of Antiquities." *Museums Journal* (November): 131–44.
- Rich, Claudius J. 1839. *Narrative of a Journey to the Site of Babylon in 1811 . . . with Narrative of a Journey to Persepolis*. London: Duncan and Malcolm.
- Richmond, Alison and Alison Bracker, eds. 2009. *Conservation: Principles, Dilemmas and Uncomfortable Truths*. Oxford: Butterworth-Heinemann.
- Richter, Gisela. 1946. "Greeks in Persia." *American Journal of Archaeology* 50: 15–30.
- Ridgway, Brunilde S. 1983. "Painterly and Pictorial in Greek Relief Sculpture." In

- Ancient Greek Art and Iconography*, edited by Warren G. Moon, 193–208. Madison, WI: University of Wisconsin Press.
1990. “Metal Attachments in Greek Sculpture.” In *Marble. Art Historical and Scientific Perspectives on Ancient Sculpture*, edited by Marion True and Jerry Podany, 185–206. Los Angeles: J. Paul Getty Museum.
- Ridolfi, Stefano, Marisa Laurenzi Tabasso, Alireza Askari Chaverdi, and Pierfrancesco Callieri. 2019. “The Finishing Technique of the Stone Monuments of Persepolis: Further Studies and New Findings through the Use of Non-Destructive Analytical Techniques.” *Archaeometry* 61 (2): 272–81.
- Rionnet, Florence. 1996. *L’atelier de moulage du Musée du Louvre (1794–1928)*. Paris: Réunion des musées nationaux.
- Ritter, Markus. 2005. *Moscheen und Madrasabauten in Iran, 1785–1848: Architektur zwischen Rückgriff und Neuerung*. Leiden: Brill.
- Roaf, Michael. 1980. “Texts about the Sculptures and Sculptors at Persepolis.” *Iran* 18: 65–74.
1983. “Sculptures and Sculptors at Persepolis.” *Iran* 21: 1–159.
1987. “Checklist of the Persepolis Reliefs Not at the Site.” *Iran* 25: 155–8.
2004. s.v. “Persepolis.” *Reallexikon der Assyriologie und Vorderasiatischen Archäologie*. Vol. 10 (5–6), 393–412. Berlin: De Gruyter.
- Robinson, Basil W. 1963. “The Court Painters of Fath Ali Shah.” *Eretz-Israel* 7: 94–105.
- Rodler, Alexandra, Cecilie Brøns, Nathalie Tepe, Thilo Hofmann, Christian Koeberl, Robert Frei, and Giberto Artioli. 2022. “Egyptian Blue from the Palace of Apries: On the Provenance of the Copper Component.” Poster presentation at the 28th Annual Meeting of the European Archaeology Association, Budapest, Hungary, August 31–September 3, 2022.
- Rodler, Alexandra, Sabine Klein, Gilberto Artioli, and Cecilie Brøns. 2019. “Probing the Provenance of Archaeological Glaze Colorants: Polychrome Faunal Reliefs of the Ishtar Gate and the Processional Way of Babylon.” *Archaeometry* 61 (4): 837–55.
- Root, Margaret Cool. 1976. “The Herzfeld Archive of the Metropolitan Museum of Art.” *Metropolitan Museum Journal* 11: 119–24.
1979. *The King and Kingship in Achaemenid Art: Essays on the Creation of an Iconography of Empire*. Acta Iranica 19. Leiden: Brill.
1988. “Evidence from Persepolis for the Dating of Persian and Archaic Greek Coinage.” *Numismatic Chronicle* 148: 1–12.
1990. “Circles of Artistic Programming: Strategies for Studying Creative Process at Persepolis.” In *Investigating Artistic Environments in the Ancient Near East*, edited by Ann Gunter, 115–39. Washington, DC: Smithsonian Institution.
1991. “From the Heart: Powerful Persianisms in the Art of the Western Empire.” In *Asia Minor and Egypt: Old Cultures in a New Empire*. Achaemenid History 6, edited by Heleen Sancisi-Weerdenburg and Amélie Kuhrt, 1–25. Leiden: Netherlands Institute for the Near East.
1994. “Lifting the Veil: Approaches to the Study of Artistic Transmission beyond the Boundaries of Historical Periodisation.” In *Continuity and Change*. Achaemenid History 8, edited by Heleen Sancisi-Weerdenburg, Amélie Kuhrt, and Margaret Cool Root, 9–37. Leiden: Netherlands Institute for the Near East.
1997. “Cultural Pluralisms on the Persepolis Fortification Tablets.” *TOPOI* 7 (Suppl. 1): 229–52.
- 2002a. “Animals in the Art of Ancient Iran.” In *A History of the Animal World in the Ancient Near East*, edited by Billie Jean Collins, 169–209. Leiden: Brill.
- ed. 2002b. “Medes and Persians: Reflections on Elusive Empires.” *Ars Orientalis* 32.
2003. “The Lioness of Elam. Politics and Dynastic Fecundity at Persepolis.” In *A Persian Perspective: Essays in Memory of Heleen Sancisi-Weerdenburg*. Achaemenid History 13, edited by Wouter F. Henkelman

- and Amélie Kuhrt, 9–32. Leiden: Netherlands Institute for the Near East..
2007. “Reading Persepolis in Greek: Gifts of the Yauna.” In *Persian Responses: Political and Cultural Interaction with(in) the Achaemenid Empire*, edited by Christopher Tuplin, 163–203. Swansea: Classical Press of Wales.
2008. “Reading Persepolis in Greek Part Two: Marriage Metaphors and Unmanly Virtues.” In *Ancient Greece and Ancient Iran. Cross-Cultural Encounters. 1st International Conference. Athens November 2006*, edited by S. M. R. Darbandi and Antigoni Zournatzi, 195–221. Athens: National Hellenic Research Foundation; Hellenic National Commission for UNESCO; Cultural Center of the Embassy of the Islamic Republic of Iran.
2010. “Palace to Temple: King to Cosmos: Achaemenid Foundation Texts in Iran.” In *From the Foundations to the Crenellations. Essays in Temple Building in the Ancient Near East and Hebrew Bible*, edited by Mark Boda and Jamie Novotny, 165–210. Münster: Ugarit-Verlag.
2011. “Elam in the Imperial Imagination: From Nineveh to Persepolis.” In *Elam and Persia*, edited by Javier Alvarez-Mon and Mark Garrison, 419–74. Winona Lake, IN: Eisenbrauns.
2013. “Defining the Divine in Achaemenid Persian Arts of Kingship.” In *Every Inch a King: Comparative Studies on Kings and Kingship in the Ancient and Medieval Worlds*, edited by Lynette Mitchell and Charles Melville, 23–65. Leiden: Brill.
2015. “Achaemenid Imperial Architecture: Performative Porticoes of Persepolis.” In *Persian Kingship and Architecture: Strategies of Power in Iran from the Achaemenids to the Pahlavis*, edited by Susan Babaie and Talinn Grigor, 1–64. London: I. B. Tauris.
2016. “Tales of Translation: Leroy Waterman: Biblical Studies, and an Achaemenid Royal-Name Alabastron from Seleucia.” In *Des contrées avestiques à Mahabad, via Bisotun. Etudes offertes en hommage à Pierre Lecoq*, edited by Celine Redard, 81–98. Paris: Recherches et Publications.
- Rose, Brian. 2014. *The Archaeology of Greek and Roman Troy*. Cambridge: Cambridge University Press.
- Rossi, Adriano. 1996. “Perception et symbolique des couleurs dans le monde iranien et d’Asie centrale.” In *Convegno internazionale sul tema: La Persia e l’Asia centrale da Alessandro al X secolo*, 87–97. Rome: Accademia nazionale dei Lincei.
2006. “Colours and Lexical Taxonomies: Linguistic and Cultural Categories in Iranian.” In *Proceedings of the 5th Conference of the Societas Iranologica Europaea, Ravenna, 6–11 October 2003*. Vol. 1, *Ancient and Middle Iranian Studies*, edited by Antonio Panaino and Andrea Piras, 459–80. Milan: Mimesis.
2021. “Multilingual Perception of Colour in Iran and the Ancient Near East.” In *Achemenet. Vingt ans après*. Persika 21, edited by Damien Agut-Labordère, Rémy Boucharlat, Francis Joannès, Amélie Kuhrt, and Matthew W. Stolper, 357–69. Leuven: Peeters.
- Rossi, Adriano and Gian-Pietro Basello. 2011. “I colori nell’Iran antico con una presentazione di A. Nagel su pitture e pigmenti a Persepoli.” Presented at the Workshop: La comunicazione tra visualità e scrittura: approcci e contesti a confro, Naples, Italy, April 15, 2011. www.elamit.net/elam/rossi_basello2011colori.pdf
- Rossi Pinelli, Orietta. 1996. “The Surgery of Memory: Ancient Sculpture and Historical Restorations.” Translated by G. Ponti and A. M. Vaccaro. In *Historical and Philosophical Issues in the Conservation of Cultural Heritage*, edited by Nicholas Stanley-Price, M. Kirby Talley Jr., and Alessandra Melucco Vaccaro, 288–305. Los Angeles: Getty Conservation Institute.
- Rouveret, Agnes, Sandrine Dubel, and Valérie Nass, eds. 2006. *Couleurs et matières dans l’antiquité: Textes, techniques et pratiques*. Paris: Editions Rue d’Ulm.
- Rouveret, Agnes and P. Walter. 1998. “La peinture des stèles hellénistiques d’Alexandrie.” In *Art et chimie. La couleur. Congrès international sur l’aport de la Chimie aux œuvres d’art 16–18 Septembre 1998, Amphithéâtre Rohan, Ecole du Louvre, Palais du Louvre*,

- Paris, 131–2. Paris: Comité d'Organisation d'Art & Chimie.
- Rowe, Christopher. 1974. "Conceptions of Colour and Colour Symbolism in the Ancient World." In *The Realms of Colors*, edited by Adolf Portman and Rudolf Ritsema, 327–64. Leiden: Brill.
- Ruben, Philippe. 1979. "Contribution à l'étude des matériaux naturels des environs de Suse (Khuzistan, Iran), et de leur utilisation pour la confection d'objets archéologiques." Doctoral thesis, Université d'Orléans.
- Rush, Laurie. 2012. "Cultural Property Protection as a Force Multiplier in Stability Operations." *Military Review* 2 (March–April): 36–43.
- Russell, John. 1999. "Some Painted Bricks from Nineveh." A Preliminary Report." *Iranica Antiqua* 34: 85–114.
- Sahlins, Marshall. 1976. "Colors and Cultures." *Semiotica* 16: 1–22.
- Sajjadi, S. Mansur Seyyed. 2007. "Wall Painting from Dahaneh-ye Gholaman (Sistan)." In *Achaemenid Culture and Local Traditions in Anatolia, Southern Caucasus and Iran: New Discoveries*, edited by Askold Ivantchik and Vakhtang Licheli, 129–54. Leiden: Brill.
- Sajjadi, S. Mansur Seyyed and F. Saber Moghaddam. 2004. "Peintures et gravures murales découvertes à Dahan-e Gholâmân, Sîstân." *Studia Iranica* 33 (2): 285–96.
- Sajjadi, S. Mansur Seyyed and Rouhollah Shirazi. 2022. "Italian Archaeologists and Restorers in Iran." In *Oran and Italy. 60 Years of Collaboration in Cultural Heritage*, edited by Pierfrancesco Callieri et al., 21–30. Rome: ISMEO.
- Sami, Ali. 1955. *Persepolis*. Shiraz: n.p.
- Sancisi-Weerdenburg, Heleen, ed. 1991a. *The Persian Empire in the West*. Achaemenid History 6. Leiden: Netherlands Institute for the Near East.
1993. "Alexander and Persepolis." In *Alexander the Great: Reality and Myth*, edited by Jesper Carlsen, 177–88. Rome: L'Erma di Bretschneider.
- Sancisi-Weerdenburg, Heleen and Jan Willem Drijvers, eds. 1990. *The Roots of European Tradition*. Achaemenid History 5. Leiden: Netherlands Institute for the Near East.
1991. *Through Travellers's Eyes: European Travellers on the Iranian Monuments*. Achaemenid History 7. Leiden: Netherlands Institute for the Near East.
- Sancisi-Weerdenburg, Heleen and Amélie Kuhrt, eds. 1990. *Centre and Periphery*. Achaemenid History 4. Leiden: Netherlands Institute for the Near East.
- Sancisi-Weerdenburg, Heleen, Amélie Kuhrt, and Margaret Cool Root, eds. 1994. *Continuity and Change*. Achaemenid History 8. Leiden: Netherlands Institute for the Near East.
- Şare Ağtürk, Tuna. 2021. *The Painted Tetrarchic Reliefs of Nicomedia: Uncovering the Colourful Life of Diocletian's Forgotten Capital*. Turnhout: Brepols.
- Saremi Naeeni, Davoud. 2020. "Studying the Recognition: An Overview of the Qajar Tile Art with an Emphasis on the Basis of 'Khaneh Atroush' Glazed Tile in Shiraz." *Iranian Journal of Archaeological Studies* 10 (1): 16–29.
- Sarkosh Curtis, Vesta. 2007. "The British and Archaeology in Nineteenth Century Persia." In *From Persepolis to the Punjab. Exploring Ancient Iran, Afghanistan and Pakistan*, edited by Elizabeth Errington and Vesta Sarkosh Curtis, 166–78. London: British Museum Press.
- Sarkosh Curtis, Vesta and Sarah Stewart, eds. 2005. *Birth of the Persian Empire I*. London: I. B. Tauris.
- Sarre, Friedrich. 1922. *Die Kunst des Alten Persien. Die Kunst des Ostens*. Berlin: Cassirer.
1929. "Ein neues Relief aus Persepolis in der vorderasiatischen Abteilung." *Berliner Museen* 50: 87–90.
- Sarre, Friedrich and Ernst Herzfeld. 1910. *Iranische Felsreliefs. Aufnahmen und Untersuchungen von Denkmälern aus alt- und mittelpersischer Zeit*. Berlin: E. Wasmuth.
- Scarce, Jennifer. 1992. "The Royal Palaces of the Qajar Dynasty: a Survey." In *Qajar Iran: Political, Social, and Cultural Change, 1800–1925*, edited by Edmund Bosworth and Carole Hillenbrand, 329–51. Costa Mesa, CA: Mazda Publications.

2009. "The Role of Colour in the Themes and Techniques of Tilework in Qajar Persia in Qajar Studies." *Journal of the International Qajar Studies Association* 9: 57–66.
- Schaudig, Hans Peter. 2010. "The Restoration of Temples in the Neo- and Late Babylonian Periods: A Royal Prerogative as the Setting for Political Argument." In *From the Foundations to the Crenellations. Essays in Temple Building in the Ancient Near East and Hebrew Bible*, edited by Mark Boda and Jamie Novotny, 141–63. Münster: Ugarit-Verlag.
- Schenkel, Wolfgang. 1963. "Die Farben in ägyptischer Kunst und Sprache." *Zeitschrift für ägyptische Sprache und Altertumskunde* 88: 131–47.
- Schiegler, Solveig, Karl L. Weiner, and Ahmed El Goresy. 1992. "The Diversity of Newly Discovered Deterioration Patterns in Ancient Egyptian Pigments: Consequences to Entirely New Restoration Strategies and to the Egyptological Colour Symbolism." In *Materials Issues in Art and Archaeology. Vol. 3, Symposium Held 27 April–1 May 1992 in San Francisco*, edited by Pamela Vandiver and James Druzik, 831–58. Pittsburgh: Materials Research Society.
- Schimmel, Annemarie and Priscilla Soucek. 1992. "Color. I: Symbolism in Persian Literature II: Use and Importance of Color in Persian Art." *Encyclopedia Iranica* 6: 46–50. www.iranicaonline.org/articles/color-pers-rang
- Schlumberger, Daniel. 1971. "La coiffure du grand roi." *Syria* 48: 375–83.
- Schmandt-Besserat, Denise, ed. 1978. *Immortal Egypt*. Malibu, CA: Undena Publications.
- ed. 1980. *Ancient Persia. The Art of an Empire*. Malibu, CA: Undena Publications.
- Schmidt, Erich F. 1953. *Persepolis I. Structures, Reliefs, Inscriptions*. Oriental Institute Publications 68. Chicago: The Oriental Institute.
1957. *Persepolis II. Contents of the Treasury and other Discoveries*. Oriental Institute Publications 69. Chicago: The Oriental Institute.
1970. *Persepolis III. The Royal Tombs and other Monuments*. Oriental Institute Publications 70. Chicago: The Oriental Institute.
- Schmitt, Rüdiger. 1991. *The Bisitun Inscriptions of Darius the Great. Old Persian Text*. London: School of Oriental and African Studies.
1996. "Considerations on the Name of the Black Sea." In *Hellas und der griechische Osten. Studien zur Geschichte und Numismatik der griechischen Welt: Festschrift für Peter Robert Franke*, edited by Auguste Miron and Wolfgang Leschhorn, 219–24. Saarbrücken: SDV.
2000. *Corpus Inscriptionum Iranicarum. I. 1. The Old Persian Inscriptions: The Old Persian Inscriptions of Naqsh-e Rostam and Persepolis*. London: Lund Humphries.
2001. "Eine weitere Vase mit Artaxerxes-Inscription." *Archäologische Mitteilungen aus Iran* 33: 191–201.
2009. *Die altpersischen Inschriften der Achaimeniden. Editio minor mit deutscher Übersetzung*. Wiesbaden: Reichert.
- Schneider, Donald D. 1977. *The Works and Doctrine of Jacques Ignace Hittorff, 1792–1867*. New York: Garland.
- Scholem, Gershom. 1974. "Farben und ihre Symbolik in der jüdischen Überlieferung und Mystik." In *The Realms of Colors*, edited by Adolf Portman and Rudolf Ritsema, 1–50. Leiden: Brill.
- Schotsmans, Eline, GesualdoBusacca, S. C. Lin, M. Vasić, A. M. Lingle, R. Veropoulidou, C. Mazzucato, B. Tibbetts, S. D. Haddow, M. Somel, F. Toksoy-Köksal, C. J. Knüsel, and Marco Milella. 2022. "New Insights on Commemoration of the Dead through Mortuary and Architectural Use of Pigments at Neolithic Çatalhöyük, Turkey." *Scientific Reports* 12: Article number 4055. <https://doi.org/10.1038/s41598-022-07284-3>
- Schultz, Peter. 2009. "Accounting for Agency at Epidauros: A Note on IGIV² 102 A1–B1 and the Economies of Style." In *Structure, Image, Ornament: Architectural Sculpture in the*

- Greek World. Proceedings of an International Conference Held at the American School of Classical Studies, 27–28 November 2004*, edited by Peter Schultz and Ralf van den Hoff, 70–8. Oxford: Oxbow Books.
- Schwahn, Britta R. 1983. *Die Glyptothek in München. Baugeschichte und Ikonologie*. Munich: UNI-Dr.
- Scott, Alexander. 1921–6. *The Cleaning and Restoration of Museum Exhibits: Report upon Investigations Conducted in the British Museum*. London: H.M. Stationery Office.
- Seidl, Ursula. 2003. “Wie waren die achämenidischen Doppelprotomen-Kapitelle ausgerichtet?” In *A Persian Perspective: Essays in Memory of Heleen Sancisi-Weerdenburg*. Achaemenid History 13, edited by Wouter F. Henkelman and Amélie Kuhrt, 67–77. Leiden: Nederlands Instituut voor het Nabije Ooste.
2005. s.v. “Polychromie.” *Reallexikon der Assyriologie* 10: 599–600.
- Semper, Gottfried. 1851a. “On the Study of Polychromy.” *Museum of Classical Antiquities* 1: 228–46.
- 1851b. *Die vier Elemente der Baukunst. Ein Beitrag zur vergleichenden Baukunde*. Braunschweig: Vieweg. Translated by H. F. Mallgrave and W. Herrmann as *The Four Elements of Architecture and Other Writings* (Cambridge: Cambridge University Press, 1989).
- Senserrich, Rosa, Anna Nualart, and Jordi Ibanez-Insa. 2017. “The Creative Process Revealed. The Role of Incisions, High-Relief Decoration and Polychromy in the Gothic Altar Frontal belonging to Sant Llorenç de Morunys.” In *Polychrome Sculpture: Tool Marks, Construction Techniques, Decorative Practice and Artistic Tradition. ICOM-CC Interim Meeting, Working Group Sculpture, Polychromy, and Architectural Decoration, Tomar, 28–29 May, 2013*, edited by Stefanie Litjens and Kate Seymour, 87–95. Paris: ICOM-CC. www.academia.edu/32881672/POLYCHROME_SCULPTURE_TOOL_MARKS_CONSTRUCTION_TECHNIQUES_DECORATIVE_PRACTICE_AND_ARTISTIC_TRADITION
- Shahbazi, A. Shahpur. 1976. *Persepolis Illustrated*. Tehran: Institute of Achaemenid Research.
1985. *Old Persian Inscriptions of the Persepolis Platform. Corpus Inscriptionum Iranicarum. Part I, Inscriptions of Ancient Iran*. London: Lund Humphries.
2004. *The Authoritative Guide to Persepolis*. Tehran: SAFIR.
- Shaer, May. 2003. “The Decorative Architectural Surface of Petra.” PhD diss., Technische Universität, FB Restaurierung.
- Sheikoleslami, Reza. 2004. “Pathology and Restoration Plan for a Bull Capital from the Unfinished Gateway at Persepolis.” *Parsa* 1 (1): 116–7.
- Sherman, Daniel and Itit Rogoff, eds. 1994. *Museum Culture: Histories, Discourses, Spectacles*. Minneapolis: University of Minnesota Press.
- Shishegar, Arman. 2017. “Zwei Neuelamische Prinzessinnen und ihre königlichen Bestattungen.” In *Iran. Frühe Kulturen zwischen Wasser und Wüste*, edited by Barbara Helwing, 202–8. Munich: Hirmer.
- Siegel, Jonah, ed. 2008. *The Emergence of the Modern Museum. An Anthology of Nineteenth Century Sources*. Oxford: Oxford University Press.
- Siegesmund, Siegfried and Rolf Snethlage, eds. 2014. *Stone in Architecture: Properties, Durability*. 5th ed. Berlin: Springer.
- Silverman, David P. 1982. “Catalogue Entries.” In *Egypt’s Golden Age: The Art of Living in the New Kingdom*, 287–9. Boston: Museum of Fine Arts.
- Simpson, St John. 2000. “Rediscovering Past Splendours from Iran: 19th-Century Plaster Casts of Sculptures from Persepolis.” *British Museum Magazine* 36: 28–9.
2004. “Making Their Mark. Foreign Travellers at Persepolis.” *ARTA* 2005 (1). achemenet.com/resources/enligne/arta/arta/htm
- 2007a. “Pottering around Persepolis: Observations on Early European Visitors

- to the Site.” In *Persian Responses. Political and Cultural Interaction with(in) the Achaemenid Empire*, edited by Christopher Tuplin, 343–56. Swansea: Classical Press of Wales.
- 2007b. “Bushir and Beyond: Some Early Archaeological Discoveries in Iran.” In *From Persepolis to the Punjab. Exploring Ancient Iran, Afghanistan and Pakistan*, edited by Elizabeth Errington and Vesta Sarkosh Curtis, 153–65. London: British Museum Press.
2009. “Relieffragment mit Kriegerdarstellung.” In *Alexander der Grosse und die Öffnung der Welt. Asiens Kulturen im Wandel*, edited by Svend Hansen, Alfried Wiczorek, and Michael Tellenbach, 288. Regensburg: Schnell & Steiner.
- Sinclair, Eddie. 2000. “The Polychromy.” In *Salisbury Cathedral. The West Front. A History and Study in Conservation*, edited by Tim Ayers, 110–30. Chichester: Phillimore.
- Siotto, Eliana. 2017. *La Policromia sui Sarcofagi Romani. Catalogo e Risultati Scientifici*. Rome: L’Erma di Bretschneider.
- Siracusano, Gabriela. 2012. “Colors and Cultures in the Andes.” In *Colors Between Two Worlds: The Florentine Codex of Bernardino de Sahagún*, edited by Gerhard Wolf and Joseph Connors, 367–78. Florence: Kunsthistorisches Institut in Florenz, Max-Planck-Institut, Villa I Tatti, the Harvard University Center for Italian Renaissance Studies
- Skovmøller, Amalie. 2020. *Facing the Colours of Roman Portraiture: Exploring the Materiality of Ancient Polychrome Forms*. Berlin: De Gruyter.
- Skovmøller, Amalie, Cecilie Brøns, and Marie Louise Sargent. 2016. “Egyptian Blue: Modern Myths, Ancient Realities.” *Journal of Roman Archaeology* 29: 371–89.
- Smith, Cecil. 1893. *Catalogue of Casts of Sculptures from Persepolis and the Neighbourhood*. London: Harrison.
- 1932a. *Catalogue of Casts of Sculptures from Persepolis and the Neighborhood. Illustrating the Art of the Old Persian Empire from 550–340 BC*. London: Trustees of the British Museum.
- 1932b. *Photographs of Casts of Persian Sculptures of the Achaemenid Period, Mostly from Persepolis. Twelve Plates*. London: Trustees of the British Museum.
- Smith, Franklin W. 1897. *Ten Halls of the Ancients Constructed on Pennsylvania Avenue, Washington*. Washington, DC: The National Galleries Company.
- Smith, Rex A. 1994. *The Carving of Mount Rushmore*. New York: Abbeville Press.
- Snethlage, Rolf. 2008. *Leitfaden Steinkonservierung. Planung von Untersuchungen und Maßnahmen zur Erhaltung von Denkmälern aus Naturstein*. 3rd ed. Stuttgart: Fraunhofer IRB Verlag.
- Sobieczky, Elisabeth. 2022. “Throne of Gold and Dress of Stars. On the Meaning of Polychromy in High Medieval Marian Sculpture.” In *Marian Devotion in the Late Middle Ages: Image and Performance*, edited by Andrea-Bianka Znorovszky and Gerhard Jaritz, 6–30. London: Routledge.
- Soheil, Mehr Azar. 2001. *Persepolis. Il concetto di monumento nell'impero achemenide*. PhD diss., Università degli studi di Roma “La Sapienza.”
2004. “Persepolis. Symbol of the Achaemenid Empire.” *World Heritage Review* 35 (2): 52–63.
2009. “Restauro archeologico in Iran.” Paper presented at the conference Cultura del Progetto in ambito archeologico, Rome, November 13, 2009.
- Spawforth, Anthony, ed. 2007. *The Court and Court Society in Ancient Monarchies*. Cambridge: Cambridge University Press.
- Spurrell, Frank C. 1895. “Notes on Egyptian Colours.” *Archaeological Journal* 52: 222–39.
- Spycket, Agnes. 1981. *La statuaire du Proche-Orient ancien*. Leiden: Brill.
- Stager, Jennifer. 2022. *Seeing Color in Classical Art: Theory, Practice, and Reception, from Antiquity to the Present*. Cambridge: Cambridge University Press.
- Stanley, Tim. 2021. “The Iranian Synthesis. An Identity Reborn.” In *Epic Iran. 5000 Years of*

- Culture*, edited by John Curtis, Ina Sarikhani Sandmann, and Tim Stanley, 165–93. London: V & A Publishing.
- Stanley-Price, Nicholas, M. Kirby Talley Jr., and Alessandra Melucco Vaccaro, eds. 1996. *Historical and Philosophical Issues in the Conservation of Cultural Heritage*. Los Angeles: Getty Conservation Institute.
- Stearns, John B. 1961. *Reliefs from the Palace of Ashurnasirpal II*. Graz: Im Selbstverlage des Herausgebers.
- Stern, Eva-Marianne. 1985. “Die Kapitelle der Nordhalle des Erechtheion.” *Athenische Mitteilungen* 100: 405–26.
- Stewart, Sarah. 2013. “Life and Afterlife.” In *The Everlasting Flame: Zoroastrianism in History and Imagination*, edited by Sarah Stewart, 34–41. London: I. B. Tauris.
- Steyaert, Delphine. 2013. “The Conservation of Polychromy on Medieval Sculptures in Belgium in the Nineteenth Century and its Perception by the Royal Monuments Commission of the Time.” In *Conservation in the Nineteenth Century*, edited by Isabelle Brajer, 91–104. London: Archetype Publications.
- Stodulski, Leon, Eugene Farrell, and Richard Newman. 1984. “Identification of Ancient Persian Pigments from Persepolis and Pasargadae.” *Studies in Conservation* 29: 143–54.
- Stol, Marten. 2021. “Review of *The Meaning of Color in Ancient Mesopotamia*. By Shiyanthi Thavapalan.” *Journal of Near Eastern Studies* 81 (1): 195–9.
- Stöllner, Thomas, Abolfazl Aali, and Natascha Bagherpour-Kashani. 2020. *Tod im Salz. Eine Archäologische Ermittlung in Persien*. Bochum: Nünnerich Asmus.
- Stöllner, Thomas, Rainer Slotta, and Abdolrasool Vatandoust, eds. 2004. *Persiens Antike Pracht. Bergbau, Handwerk, Archäologie*. 2 vols. Bochum: Deutsches Bergbau-Museum.
- Stolper, Matthew W. 1996. “Vase Fragment.” In *Sepphoris in Galilee. Crosscurrents of Culture*, edited by Rebecca Martin Nagy, Carol Meyers, Eric Meyers, and Weiss Zeev Nagy, 166–7. Winona Lake, IN: Eisenbrauns.
- Stolper, Matthew W. and Joan Westenholz. 2002. “Quadrilingual Inscriptions of Darius I on a Fragmentary Stone Jar.” *ARTA* 2002 (5). www.achemenet.com/pdf/arta/2002.005-loc.pdf
- Strabo. *Geographica*. With an English Translation by H. L. Jones. Cambridge, MA: Harvard University Press and W. Heinemann 1932.
- Stronach, David. 1978. *Pasargadae: A Report on the Excavations Conducted by the British Institute of Persian Studies from 1961 to 1963*. Oxford: Clarendon Press.
2005. “Ernst Herzfeld and Pasargadae.” In *Ernst Herzfeld and the Development of Near Eastern Studies, 1900–1950*, edited by Ann Gunter and Stefan Hauser, 103–35. Leiden: Brill.
- Strudwick, Nigel. 1991. “The Objective-Colour Measuring System for the Recording of Egyptian Tomb Paintings.” *Journal of Egyptian Archaeology* 77: 43–56.
- Stubbe Østergaard, Jan. 2017. “Colour Shifts. On Methodologies in Research on the Polychromy of Greek and Roman Sculpture.” *Proceedings of the Danish Institute at Athens* 8: 149–76.
- Stubbe Østergaard, Jan and Anne Marie Nielsen, eds. 2014. *Transformations. Classical Sculpture in Colour*. Copenhagen: Ny Carlsberg Glyptotek.
- Stutz, Heinke. 1990. *Die Farbe Purpur im Frühen Griechentum: Beobachtet in der Literatur und in der Bildenden Kunst*. Stuttgart: B. G. Teubner.
- Sue, Li. 2015. “Digital Recolourisation and the Effects of Light on Neo-Assyrian Reliefs.” *Antiquity Journal* 89 (348). www.antiquity.ac.uk/projgall/sou348
- Summerer, Lâtife and Alexander von Kienlin, eds. 2010. *Tatarlı: renklerin dönüşü/The Return of Colours/Rückkehr der Farben*. Istanbul: T.C. Kültür ve Turizm Bakanlığı.
- Summitt, Jeremy B. 2000. “Greek Architectural Polychromy from the Seventh to Second Centuries B.C.: History and Significance.” PhD diss., University of Michigan.

- Sumner, William. 1976. "Excavations at Tall-i Malyan (Anshan)." *Iran* 14: 103–16.
1986. "Achaemenid Settlement in the Persepolis Plain." *American Journal of Archaeology* 90: 3–31.
- Sweek, Tracey and St John Simpson. 2009. "An Unfinished Achaemenid Sculpture from Persepolis." *British Museum Technical Research Bulletin* 3: 83–8.
- Swimoff, Lois. 2000. *The Color of Cities: An International Perspective*. New York: McGraw-Hill.
- Tajvidi, Akbar. 1976. *New Data on the Art and Archaeology of the Achaemenid Period Based on Five Years of Excavations at Persepolis, 1968 to 1973*. [in Persian] Tehran: Iranian Center of Archaeological Research.
- Talebian, Mohammad H. 2007. "Persepolis-Pasargadae Field Investigations." In *Proceedings of the 51st Rencontre Assyriologique Internationale, held at the Oriental Institute of the University of Chicago, July 18–22, 2005*, edited by Robert Biggs, Jennie Myers, and Martha T. Roth, 421–32. Chicago: The Oriental Institute.
- Tamerus, Mark. 2018. "Labour in the Achaemenid Heartland." In *What's in a Name? Terminology Related to the Workforce and Job Categories in the Ancient Near East*, edited by Agnès Garcia-Ventura, 467–93. Münster: Ugarit-Verlag.
- Tanre, Juliette. 2008. "Conservation des peintures murales égyptiennes au XIXe siècle." *Techné* nos. 27–28: 191–5.
- Taschner, Moritz and Stephan Zink 2016. "Magnesia am Mäander in der Berliner Antikensammlung. Neue Ansätze zur Erforschung antiker Architektur." *Antike Welt* 2: 35–7.
- Taubert, Johannes. 2016. *Polychrome Sculpture: Meaning, Form, Conservation*, edited by M. Marincola. Los Angeles: Getty Conservation Institute.
- Tavernier, Jan. 2007. *Iranica in the Achaemenid Period (ca. 550–330 B.C.). Lexicon of Old Iranian Proper Names and Loanwords, Attested in Non-Iranian Texts*. Leuven: Peeters.
- Teeter, Emily. 2012. "Copy of the Bust of Nefertiti." In *Picturing the Past. Imaging and Imagining the Ancient Middle East*, edited by Jack Green, Emily Teeter, and John Larson, 165–6. Chicago: The Oriental Institute.
2019. "A History of the Museum." In *Discovering New Pasts. The OI at 100*, edited by Theo van den Hout, 62–75. Chicago: The Oriental Institute.
- Tefnin, Roland, ed. 1997. *La peinture égyptienne ancienne. Un monde de signes à préserver*. Brussels: Brepols.
- Terry-Fritsch, Allie. 2015. "Performing the Renaissance Body and Mind: Somaesthetic Style and Devotional Practice at the Sacro Monte di Varallo." *Open Arts Journal* 4 (January): 112–32.
- Texier, Charles. 1842. *Description de l'Arménie, la Perse et la Mésopotamie*. Vol. 1. Paris: Typographie de Firmin Didot frères.
1852. *Description de l'Arménie, la Perse et la Mésopotamie*. Vol. 2. Paris: Typographie de Firmin Didot frères.
- Thackston, Wheeler M. 1990. "Treatise on Calligraphic Arts: A Disquisition on Paper, Colors, Inks and Pens by Simi of Nishapur." In *Intellectual Studies on Islam: Essays Written in Honor of Martin Dickson, Professor of Persian Studies, Princeton University*, edited by Vera Basch Moreen and Michel Mazzaoui, 219–28. Salt Lake City: University of Utah Press.
- Thavapalan, Shiyanthi. 2019a. "Color and Affect in Nebuchadnezzar II's Babylon." In *A Wonder to Behold: Craftsmanship and the Creation of Babylon's Ishtar Gate*, edited by Anastasia Amrhein, Clare Fitzgerald, and Elizabeth Knott, 127–34. Princeton, NJ: Princeton University Press.
- 2019b. *The Meaning of Color in Ancient Mesopotamia*. Leiden: Brill.
2020. "Speaking of Colors." In *Mesopotamian Sculpture in Colour*, edited by Astrid Nunn and Heinrich Piening, 194–9. Gladbeck: PeWe-Verlag.
- Thavapalan, Shiyanthi, Jens Stenger, and Carol Snow. 2016. "Color and Meaning in Ancient Mesopotamia: The Case of

- Egyptian Blue." *Zeitschrift für Assyriologie und Vorderasiatische Archäologie* 106 (2): 198–214.
- Thavapalan, Shiyanthi and David Warburton, eds. 2020. *The Value of Colour: Material and Economic Aspects in the Ancient World*. Berlin: EditionTopoi.
- Thiemann, Laura. 2009. "Die assyrischen Steinreliefs im Staatlichen Museum Ägyptischer Kunst München." Unpublished thesis, Technische Universität München.
- Thomas, Ariane. 2016. *L'histoire commence en Mésopotamie*. Ghent/Snoeck: Louvre Lens.
2018. "170 Years of Curatorial Practices and Audiences at the Louvre. Exhibiting Ancient Middle Eastern Antiquities from 1847 to 2017." In *Museums and the Ancient Middle East*, edited by Geoff Emberlin and Lucas Petit, 41–60. New York: Routledge.
2020. "A Puzzle Made of Glazed Bricks at Khorsabad." *Revue d'assyriologie et d'archéologie orientale* 114: 103–58.
- Thomas, Deborah A. 2008. "Assyrian Monsters and Domestic Chimeras." *Studies in English Literature, 1500–1900* 48 (4): 897–910.
- Thompson, Deborah. 1976. *Stucco from Chal Tarkhan Eshghabad near Rayy*. London: Aris & Phillips.
- Thompson, R. Campbell. 1936. *A Dictionary of Assyrian Chemistry and Geology*. Oxford: Clarendon Press.
- Thureau-Dangin, François and Maurice Dunand. 1936. *Til Barsip*. Paris: n.p.
- Tilia, Ann Britt. 1968. "New Restoration Work at Persepolis." *East and West* 18: 67–108.
- 1969a. "Restoration Work in Progress on the Terrace of Persepolis." *Bulletin of the Asia Institute* 1: 52–69.
- 1969b. "Reconstruction of the Parapet on the Terrace Wall at Persepolis, South and West of Palace H." *East and West* 19: 9–43.
1972. *Studies and Restorations at Persepolis and Other Sites of Fars. Part I*. Rome: ISMEO.
1974. "Discoveries at Persepolis." In *Proceedings of the 3rd International Symposium on Archaeological Research in Iran. 29th October–1st November 1973*, edited by Firouz Bagherzadeh, 239–53. Tehran: Iranian Center for Archaeological Research.
1977. "Recent Discoveries at Persepolis." *American Journal of Archaeology* 81: 67–77.
1978. *Studies and Restorations at Persepolis and Other Sites of Fars. Part II*. Rome: ISMEO.
- Tilia, Giuseppe. 1995. "Appunti sull'uso del colore nella sala del Consiglio di Persepolis." In *L'arco di fango, Studi in onore Eugenio Galdieri*, edited by Michele Bernardini, 321–2. Lugano: Edizioni Arte e Monet.
- Tilia, Giuseppe and Pierfrancesco Callieri. 2001. "I restauri italiani dell'ISMEO a Persepoli negli anni '60 and '70." In *Antica Persia. I tesori del Museo Nazionale di Teheran e la ricerca italiana in Iran*, edited by Alfonso Archi et al., 44–49. Rome: De Luca.
- Tiverios, Michael, ed. 2002. *Color in Ancient Greece. The Role of Color in Ancient Greek Art and Architecture (700–31 B.C.): Proceedings of the Conference held in Thessaloniki, 12th–16th April, 2000*. Thessaloniki: Aristoteleio Panepistēmio.
- Tiverios, Michael and Chrysoula Saatsoglou-Paliadeli, eds. 1987. *AMITOS: An Honorary Volume for Manolis Andronikos*. [in Greek] Thessaloniki: Aristotle University of Thessaloniki.
- Tomabechi, Yoko. 1980. "Wall Painting and Color Pigments of Ancient Mesopotamia." PhD diss., University of California, Berkeley.
- 1983a. "Wall Paintings from Til Barsip." *Archiv für Orientforschung* 41: 63–74.
- 1983b. "Wall Paintings from Dur Kurigalzu." *Journal of Near Eastern Studies* 42 (2): 123–31.
- Toscane, Paul. 1916. "Motifs nouveaux de décoration susienne." *Revue Archéologique* 13: 69–89.
- Trentelman, K. M. Bouchard, M. Ganio, C. Namowicz, C. Patterson, and M. Walton. 2010. "The Examination of Works of Art Using *in Situ* XRF Line and Area Scans." *X-ray Spectrometry* 39 (3): 159–66.
- Treuer, Lisa, ed. 2017. *The Archaeology of Mural Painting at Panamarca, Peru*. Washington,

- DC: Dumbarton Oaks Research Library and Collection.
- Trichet, Jean and Philippe Ruben. 1980. "Méthodes d'étude de l'origine des matériaux ayant servi à la confection de briques et de céramiques dans les sites de Suse et de Djaffarabad (Khuzestan, Iran)." *Paléorient* 6: 129–58.
- Trichet, Jean and François Vallat. 1990. "L'origine égyptienne de la statue de Darius." In *Contribution à l'histoire de l'Iran: Mélanges offerts à Jean Perrot*, edited by François Vallat, 205–8. Paris: Éditions Recherche sur les Civilisations.
- Trümpelmann, Leo. 1983. "Zu den Gebäuden von Persepolis und ihrer Funktion." In *Kunst, Kultur und Geschichte der Achämenidenzeit und ihr Fortleben*, edited by Heidmarie Koch and D. N. Mackenzie, 225–37. Berlin: Reimer.
1988. *Persepolis. Ein Weltwunder der Antike*. Mainz: Zabern.
1992. *Zwischen Persepolis und Firuzabad. Gräber, Paläste und Felsreliefs im alten Persien*. Mainz: Zabern.
- Tudeau, Johanna. 2019. *Building in Assyria*. Wiesbaden: Harrassowitz.
- Tuplin, Christopher. 1998. "The Seasonal Migration of Achaemenid Kings. A Report on Old and New Evidence." In *Studies in Persian History. Essays in Memory of David M. Lewis*. Achaemenid History 11, edited by Maria Brosius and Amélie Kuhrt, 63–114. Leiden: Nederlands Instituut voor het Nabije Ooste.
2013. *The Arshama Letters from the Bodleian Library. Commentary*. Oxford: Bodleian Library, University of Oxford.
2021. "Royal P(a)laces: Lexical Reflections on Achaemenid Residences." In *Achemenet. Vingt ans après*. Persika 21, edited by Damien Agut-Labordère, Rémy Boucharlat, Francis Joannès, Amélie Kuhrt, Matthew W. Stolper, 403–14. Leuven: Peeters.
- ed. 2007. *Persian Responses. Political and Cultural Interaction with(in) the Achaemenid Empire*. Swansea: Classical Press of Wales.
- Türr, Karina. 1994. *Farbe und Naturalismus in der Skulptur des 19. und 20. Jahrhunderts*. Mainz: Zabern.
- Twyman, Michael. 2013. *A History of Chromolithography. Printed Colour for All*. London: The British Library; Oak Knoll Press.
- Uchitel, Alexander. 1991. "Foreign Workers in the Fortification Archive." In *Mésopotamie et Elam: Actes de la XXXVI^e Rencontre Assyriologique Internationale, Gand. 10–14 Juillet 1989*, edited by Léon de Meyer and Hermann Gasche, 127–35. Ghent: University of Ghent.
- Unger, Eckhard. 1971. s.v. "Farben und Farbe in der orientalischen Malerei." *Reallexikon der Assyriologie* 3: 19–25.
- Vallat, François. 2013. "The Main Achaemenid Inscriptions at Susa." In *The Palace of Darius at Susa: The Great Royal Residence of Achaemenid Persia*, edited by Jean Perrot, 280–95. London: I. B. Tauris.
- Van den Berghe, Louis. 1959. *Archéologie de l'Iran ancien*. Leiden: Brill.
1963. "Les reliefs élamites de Malamir." *Iranica Antiqua* 3: 22–39.
- Van Zanten, David. 1977. *The Architectural Polychromy of the 1830s*. New York: Garland.
- Vandenabeele, P., R. Garcia-Moreno, F. Mathis, K. Leterme, E. van Elslande, F.P. Hocquet, S. Rakkaa, D. Laboury, L. Moens, D. Strivay, and Melinda Hartwig 2009. "Multi-Disciplinary Investigation of the Tomb of Menna (TT69), Theban Necropolis, Egypt." *Spectrochimica Acta A* 73: 546–52.
- Van de Wetering, Ernst. 2007. "The Cleaning of Paintings by Rembrandt. New Arguments in a Controversy." *ICOM-CC Working Group, Theory and History of Conservation-Restoration' Newsletter* 13: 9–11.
- Vatandoust, Abdolrasool. 1994. *An Assessment of Existing Institutions and Potentials in Iran for Conservation and Restoration of Cultural Heritage and the Possibilities of Regional and Subregional Cooperation. Report on a Survey Sponsored by UNDP-Tehran*. Tehran: United Nations Development Program.

- Vaux, William. 1850. *Nineveh and Persepolis*. London: Arthur Hall, Virtue, & Co.
- Verret, Dennis and Delphine Steyaert, eds. 2002. *La Couleur et la Pierre: Polychromie des Portails Gothiques. Actes du Colloque, Amiens, 12–14 octobre 2000*. Amiens: Agence régionale du patrimoine de Picardie.
- Verri, Giovanni. 2009. “The Spatial Characterisation of Egyptian Blue: A Study by Visible-Induced Luminescence Digital Imaging.” *Analytical and Bioanalytical Chemistry* 394 (4): 1011–21.
- Verri, Giovanni, Paul Collins, Janet Ambers, Tracey Sweek, and St John Simpson. 2009. “Assyrian Colours: Pigments on a Neo-Assyrian Relief of a Parade Horse.” *The British Museum Technical Research Bulletin* 3: 57–62.
- Vickers, Michael. 1991. “The Views of Persepolis by William Marshall and Wenceslaus Hollar in Sir Thomas Herbert’s Travels.” In *Through Travellers’ Eyes: European Travellers on the Iranian Monuments*, edited by Heleen Sancisi-Weerdenburg and Jan W. Drijvers, 59–69. Leiden: Nederlands Instituut voor het Nabije Oosten.
- Victoir, Géraldine. 2012. “La polychromie et l’apport de son étude à la connaissance de l’architecture gothique.” In *Architecture et Sculpture Gothiques*, edited by Stéphanie Daussy and Arnaud Timbert, 121–35. Rennes: Presses universitaires de Rennes.
- Villard, Laurence, ed. 2002. *Couleurs et vision dans l’antiquité classique*. Rouen: Publications de l’université de Rouen.
- Villard, Pierre. 2010. “Les textiles néo-assyriens et leurs couleurs.” In *Textile Terminologies in the Ancient Near East and Mediterranean from the Third to the First Millennium BC*, edited by Cecile Michel and Marie-Louise Nosch, 388–99. Oxford: Oxbow Books.
- Vlassopoulou, Christina. 2008. “Neue Untersuchungen zur Farbigkeit des Parthenon.” In *Bunte Götter: Die Farbigkeit antiker Skulptur. Eine Ausstellung der Liebieghaus Skulpturensammlung, Frankfurt am Main in Kooperation mit der Stiftung Archäologie, München, 8. Oktober 2008–15. Februar 2009, 144–7*. Frankfurt: Liebieghaus Skulpturensammlung.
2017. “An Inscribed Bronze Phiale from the Acropolis.” [in Greek] *Grammateion* 6: 33–41.
- Vogelsang-Eastwood, Gillian. 2006. “A Preliminary Survey of Iranian Archaeological Sites with Textiles.” In *Textiles in Situ. Their Find Spots in Egypt and Neighbouring Countries in the First Millennium CE*, edited by Sabine Schrenk, 221–40. Riggisberg: Abegg-Stiftung.
- Von Gall, Hubertus. 1974. “Die Kopfbedeckung des persischen Ornats bei den Achämeniden.” *Archäologische Mitteilungen aus Iran n.s.* 7: 145–61.
- Von Gall, Hubertus and Paul Luft. 2020. *Die Qājārischen Felsreliefs. Eine kunst- und kulturwissenschaftliche Studie*. Berlin: Dietrich Reimer Verlag.
- Vuilleumard, Anne. 2001. “La polychromie des cathédrales gothiques.” In *20 siècles en cathédrales*, edited by Catherine Arminjon, Denis Laval, and Jacques Le Goff, 219–28. Paris: Encyclopaedia Universalis.
- Vuurman, Corien. 2015. *Fascinatie voor Persepolis. Europese perceptie van Achaemenidische monumenten in schrift en beeld, van de veertiende tot het begin van de twintigste eeuw*. Gronsveld: Barjesteh van Waalwijk van Doorn & Co.
- Waetzold, Hartmut. 2010. “The Colours and Variety of Fabrics from Mesopotamia during the Ur III period (2050 BC).” In *Textile Terminologies in the Ancient Near East and Mediterranean from the Third to the First Millennium bc*, edited by Cecile Michel and Marie-Louise Nosch, 201–9. Oxford: Oxbow Books.
- Wallace, Florence E. 1927. “Color in Homer and in Ancient Art.” *Smith Classical Studies* 9: 1–83.
- Wallert, Arie, Erma Hermens, and Marja Peek, eds. 1996. *Historical Painting Techniques, Materials, and Studio Practice*. Preprints of a Symposium [held at] University of Leiden, the Netherlands, 26–29 June 1995. Los Angeles: Getty Conservation Institute.

- Walser, Georg. 1966. *Die Völkerschaften auf den Reliefs von Persepolis. Historische Studien über den sogenannten Tributzug an der Apadanatreppe*. Berlin: Mann.
- Ward, James. 1913. *Colour Decoration on Architecture*. London: Chapman & Hall.
- Wartke, Ralf-B. 1992. *Das Vorderasiatische Museum*. Mainz: Zabern.
- Wasmuth, Melanie and Pearce P. Creasman, eds. 2020. "Udjahorresnet and His World." Special volume. *Journal of Ancient Egyptian Interconnections* 26. <https://egyptianexpedition.org/volumes/vol-26-udjahorresnet-and-his-world/>
- Waters, Matt. 2014. *Ancient Persia: A Concise History of the Achaemenid Empire, 550–330 bce*. Cambridge: Cambridge University Press.
- Wawrzyniak, James. 2008. "Rubin v. The Islamic Republic of Iran: A Struggle for Control of Persian Antiquities in America." In *Yearbook of Cultural Property Law 2008*, edited by Sherry Hutt and David Tarler, 223–72. New York: Routledge.
- Weeks, Christopher. 1998. "The 'Portail de la Mère Dieu' of Amiens Cathedral: Its Polychromy and Conservation." *Studies in Conservation* 43: 101–8.
- Weissbach, Franz. 1911. *Die Keilinschriften der Achämeniden*. Leipzig: J. C. Hinrichs.
- Welch, Anthony. 1973. *Shah Abbas and the Arts of Isfahan*. New York: Asia Society.
- Weld-Blundell, Herbert. 1893. "Persepolis." In *Transactions of the Ninth International Congress of Orientalists*. Vol. 2, edited by E. Delmar Morgan, 537–59. London: Ballantyne Press.
- Wescoat, Bonna and Rebecca Levitan 2017. "Seeing the Parthenon Frieze." In *Greek Art in Context. Archaeological and Art Historical Perspectives*, edited by Diana Rodriguez-Perez, 7–72. New York: Routledge.
- West FitzHugh, Elizabeth. 1997a. "Orpiment and Realgar." In *Artists' Pigments: A Handbook of Their History and Characteristics*, 47–80. New York: Oxford University Press.
- ed. 1997b. *Artists' Pigments: A Handbook of Their History and Characteristics*. New York: Oxford University Press.
- Westmacott, Richard, Jr. 1854. "On Colouring Statues." *Archaeological Journal* 12: 22–46.
- Wharton, Glenn. 2012. *The Painted King: Art, Activism and Authenticity in Hawai'i*. Hawaii: University of Hawai'i Press.
- Whitcomb, Donald. 2012. "Lusterware Jug from Rayy, Iran." In *Picturing the Past. Imaging and Imagining the Ancient Middle East*, edited by Jack Green, Emily Teeter, and John Larson, 143–4. Chicago: The Oriental Institute.
- Whitehead, John D. 1974. "Early Aramaic Epistolography. The Arsames Correspondence." PhD diss., University of Chicago.
- Wiedemann, Hans-Georg and G. Bayer. 1982. "The Bust of Nefertiti: The Analytical Approach." *Analytical Chemistry* 54: 619A–28A.
- Wiesehöfer, Josef. 1991. "Engelbert Kaempfer in Naqš-e Rostam und Persepolis." In *Through Travellers' Eyes: European Travellers on the Iranian Monuments*, edited by Heleen Sancisi-Weerdenburg and Jan W. Drijvers, 71–87. Leiden: Nederlands Instituut voor het Nabije Oosten.
1994. *Die "dunklen Jahrhunderte" der Persis. Untersuchungen zu Geschichte und Kultur von Fars in frühhellenistischer Zeit (330–140 v. Chr.)*. Munich: C. H. Beck.
- Wilber, Donald. 1942. "The Role of Color in Architecture." *Journal of the American Society of Architectural Historians* 2 (1): 17–22.
1950. "A Relief from Persepolis." *Record of the Art Museum, Princeton University* 9 (2): 2–3.
1968. "Introduction." In *Design and Color in Islamic Architecture*, edited by Sonia and Hilde Seher-Thoss. Washington, DC: Smithsonian Institution Press.
1969. *Persepolis. The Archaeology of Parsa, Seat of the Persian Kings*. New York: Crowell.
1986. *Adventures in the Middle East. Excursions and Incursions*. Princeton, NJ: Darwin.
- Williams, Dyfri, Peter Higgs, Thorsten Opper, and Mark Timson. 2007. "A Virtual

- Parthenon Metope: Restoration and Colour." In *Color of Gods: Painted Sculpture of Classical Antiquity*, edited by Vinzenz Brinkmann and Raimund Wünsche, 113–17. Munich: Prestel.
- Wilson, Andrew. 2007. "The Metal Supply of the Roman Empire." In *Supplying Rome and the Roman Empire*. Journal of Roman Archaeology suppl. series 69, edited by Emanuele Papi and Michel Bonifay, 109–25. Portsmouth, RI: Journal of Roman Archaeology
- Winter, Irene J. 1995. "Aesthetics in Ancient Mesopotamian Art." In *Civilizations of the Ancient Near East*, edited by Jack Sasson, John Baines, Gary Beckman, and Karen S. Robinson, 2569–80. New York: Scribner.
1999. "The Aesthetic Value of Lapis Lazuli in Mesopotamia." In *Cornaline et pierres précieuses: La Méditerranée de l'antiquité à l'Islam*, edited by Annie Caubet, 43–58. Paris: Documentation française. Reprinted in *On Art in the Ancient Near East*. Vol. 2, 291–306 (Leiden: Brill, 2009).
2003. "Ornament and the Rhetoric of Abundance in Assyria." *Eretz Israel* 27: 252–64. Reprinted in *On Art in the Ancient Near East*. Vol. 1, 163–83 (Leiden: Brill, 2009).
2009. *On Art in the Ancient Near East*. 2 vols. Leiden: Brill.
- Wiseman, Donald J. 1952. "A New Stela of Assur-nasir-pal II." *Iraq* 14: 24–44.
- Wlach, Gudrun. 2010. "Klassische Archäologie in politischen Umbruchzeiten. Wien 1938–1945," In *Geisteswissenschaften im Nationalsozialismus. Das Beispiel der Universität Wien*, edited by Mitchell Ash, Wolfram Nieß, and Ramon Pils, 343–70. Vienna: Vienna University Press.
- Wolters, Paul. 1921. "Neues von der Glyptothek." *Münchener Neueste Nachrichten* (August 2): 321.
- Wordsworth, Christopher. 1837. *Athens and Attica: Journal of a Residence There*. 2nd ed. London: John Murray.
- Yongqi, Wu, Zhang Tinghao, Michael Petzet, Erwin Emmerling, and Catharina Blänsdorf, eds. 2001. *The Polychromy of Antique Sculptures and the Terracotta Army of the First Chinese Emperor*. Munich: Bayerisches Landesamt für Denkmalpflege.
- Young, Diana. 2006. "The Colours of Things." In *Handbook of Material Culture*, edited by Christopher Tilley, Webb Keane, Susanne Kuechler, Michael Rowlands, and Patricia Spyer, 173–85. London: Sage.
- Yvantidis, Konstantinos. 1984. "Die Polychromie der hellenistischen Plastik." Doctoral thesis, Johannes Gutenberg-Universität.
- Zaccagnini, Carlo. 1983. "Patterns of Mobility among Ancient Near Eastern Craftsmen." *Journal of Near Eastern Studies* 42: 245–64.
- Zamani, N. and H. Ahmadi 2022. "The Tradition of Previous Repairs and the Foundations of New Approaches to the Conservation and Restoration of Murals at Chehel Sotoun." *Parseh. Journal of Archaeological Studies* 18 (5): 237–63.
- Zambon, Alessia. 2012. "Les premiers voyageurs et la dorure du Parthénon. Mise au point sur une controverse ancienne." *Revue Archéologique* 53 (1): 41–61.
- Zander, Giuseppe, ed. 1968. *Travaux de restauration de monuments historiques en Iran*. Rome: ISMEO.
- Zapata-Aubé, Nicole, ed. 1997. *Lottin de Laval. Archéologue et peintre orientaliste, 1810–1903*. Bernay: Editions de l'Association pour la promotion de la culture.
- Zare, Azam. 2004. "The Identification of Stone Quarries in the Marvdasht Plain and Comparing Them with the Stones Used in the Architecture of Persepolis Complex on the Basis of Archeological Studies and Petrographical Results." [in Persian] Unpublished report, Shiraz.
- Zawadski, Stefan. 2006. *Garments of the Gods. Studies on the Textile Industry and the Pantheon of Sippar According to the Texts from the Ebabbar Archive*. Fribourg: Academic Press.
2010. "Garments in Non-Cultic Context." In *Textile Terminologies in the Ancient Near East and Mediterranean from the Third to the First*

- Millennia bc*, edited by Cecile Michel and Marie-Louise Nosch, 409–29. Oxford: Oxbow Books.
2013. *Garments of the Gods*. Vol. 2. *Texts*. Fribourg: Academic Press.
2021. “Contribution to the Persian Nobility in Babylonia.” In *Individuals and Institutions in the Ancient Near East. A Tribute to Ran Zadok*, edited by Uri Gabbay and Shai Gordin, 89–105. Boston: De Gruyter.
- Zehbari, Zohreh 2021. “On the Participation of Egyptian Artists in Achaemenid Art.” In *Bridging the Gap: Disciplines, Times, and Spaces in Dialogue*. Vol. 1, *Sessions 1, 2, and 5 from the Conference Broadening Horizons 6*, edited by Christian W. Hess and Federico Manuelli, 59–79. London: Archaeopress.
- Zehnder, Konrad, Andreas Arnold, and Andreas Kung. 2000. “Weathering of Painted Marly Limestones in the Temple Ruin of Merenptah, Qurna/Luxor (Egypt).” In *Proceedings of the 9th International Congress on Deterioration and Conservation of Stone*. Vol. 2, edited by Vasco Fassina, 749–58. Amsterdam: Elsevier.
- Zessin, May-Sarah. 2019. “Reading between the Lines: Fitters’ Marks in the Ancient Near East.” In *A Wonder to Behold: Craftsmanship and the Creation of Babylon’s Ishtar Gate*, edited by Anastasia Amrhein, Clare Fitzgerald, and Elizabeth Knott, 81–90. Princeton, NJ: Princeton University Press.
- Ziegler, Christiane. 2002. *Le Scribe accroupi*. Paris: Réunion des musées nationaux.
- Zink, Stephan. 2019. “Polychromy. Architectural, Greek and Roman.” In *Oxford Classical Dictionary*. Oxford: Oxford University Press. <https://doi.org/10.1093/acrefore/9780199381135.013.8184>
- Zink, Stephan and Heinrich Piening. 2009. “Haec aurea templa: The Palatine Temple of Apollo and Its Polychromy.” *Journal of Roman Archaeology* 22: 109–22.
- Zink, Stephan, Moritz Taschner, Ina Reiche, Matthias Alfeld, Cristina Aibéo, Ellen Egel, Katharina Müller, Anne Ristau, Birgit Neuhaus, and Wolfgang Massmann 2019. “Tracing the Colours of Hermogenes’ Temple of Artemis: Architectural Surface Analysis in the Antikensammlung Berlin.” *Technè* no. 48: 14–26.
- Zournatzi, Antigoni. 2003. “The Apadana Coin Hoards, Darius I, and the West.” *American Journal of Numismatics* Ser. 2 15: 1–28.

INDEX

- aesthetics, 20
Afghanistan, 13, 51
Afifabad, 209
Akkadian language, 23
Alexander III of Macedon/Iskander, 62–3, 155, 188
Alexander Sarcophagus, 26
Andrae, Walter, 49
Anjoman, 209
Anšan, archaeological site, 60–1
Aramaic, 90
Ardeshir, 203
Artaxerxes I, 28
Artaxerxes II, 134–5, 137–9, 187
Artaxerxes III, 99, 180
Assur, 179
Assurnasirpal II, 26
Athens, Acropolis, 145, 179, 208
- Babylon, 60, 79, 82, 143
Bamiyan, Afghanistan, 13
Bastiani, Donato, 161–6
Batchelor, David, 8–9, 21–2, 45–6
Bavaria, 17, 47, 49, 53, 84, 215
Beale, Truxton, 150
Beard, 33, 40, 43, 98, 99, 113, 129, 134, 194, 195
Berlin, 46–7, 79–82, 141, 150–3
Béziers, 90
Bioorganisms, living, 205
Bishapur, 10, 203
Bisotun, 131
Blanc, Charles, 45
Bonomi, Joseph, 36
Borazjan, 15, 175
Botta, Paul-Émile, 32–3
Breasted, James Henry,
– and correspondence with Ernst Herzfeld, 2–3, 103
British Museum, London, 36, 42, 50, 54, 55, 87, 91, 149–51
Brujin, Cornelius De, 146
Brussels, Belgium, 209
Buckingham, James, 68
Burchardt, Hermann, 211–12, 214
- Calmeyer, Peter, 105–6
Casts and casting, mold making, 146–50
Chardin, Jean, 68
Chipiez, Charles, 46, 84–6
chaîne opératoire, 7, 19
chromolithography, 34, 58, 70, 83, 84
chromophobia, 8, 19, 21, 31, 45, 76, 209
cloisonné, 27–8, 108
Coste, Pascal, 36, 72, 84
Crystal Palace,
see also Nineveh
Ctesiphon, Iraq, 204
Curzon, George, 87
Cyrus II (the Great), 60, 115, 150
- Darius I (the Great), 3, 5, 17, 23, 27, 61, 64, 68, 70, 72, 78, 80–2, 84–8, 90–2, 98–9, 117, 122, 124, 126–36, 142, 146–8, 150–2, 154, 159, 175, 181–3, 186, 190, 195, 198–9, 202
Statue of D. at Susa, 183
Darius III, 115
Dehbid deposits, 185
Dieulafoy, Jane and Marcel, 74–84, 90–1
Diodorus, 62–3
Douzklakh, saltmines, textiles, 23, 66, 192
Dur Sharrukin, present day Khorsabad, Iraq, 33–4, 43–6, 54–5, 107, 179
- Ecbatana (modern Hamadan), 64
Egypt, 179–80, 199
–workmen and painters at Persepolis
and Susa, *see* painters
Elam, Elamite, 23, 190–1, 195, 198
- Faryadan mines, 185
Fath' Ali Shah, 211–12
Ferdowsi, 10, 12, 209
Fergusson, James, 34–42
Flandin, Eugene, 32–4
- Ganjnameh, 129, 202
George Mason University, Virginia, 151
Ghirshman, Roman, 126

- Gilgamesh, 10
 Giuntini, Lorenzo, 150–1
 glazed brick decoration, 23–8, 32, 49, 61, 75–9,
 82–7, 90–2, 99, 103, 107, 115, 127–9, 170–2,
 195, 202
 Greek marble sculpture, excavated at Persepolis, 203
- Hall of the Ancients, Washington, DC, 48
 Harcourt Smith, Cecil, 150
 Harvard, Straus Center for Conservation and
 Technical Studies, 219
 Hatra, Iraq, 204
 Haussknecht, Carl Heinrich, 148
 Herbert, Thomas, 67
 Herodotus, 64
 Herzfeld, Ernst, 1–4, 15, 89, 92–115, 152–6
 Houssay, Frédéric, 72, 74
- Institute of Achaemenid Research, 158
 Iran–Iraq War, 182
 Isfahan, Natural History Museum, 186
 Isfahan, Ali Qapu, Chehel Sotoun,
 Safavid Persian wall paintings, 68
- Jastrow, jr., Morris, review in *New York Times*, 76
 Jones, Owen, 34–8, 41
- Kaempfer, Engelbert, 67
 Kan Gohar mines, 185
 Kaupirriš, modern Kāmfrūz, 176
 Krefter, Friedrich, 92, 105–7, 128
 Kuh e Kwaja, 3
- lapis lazuli, 172, 184, 189–90, 195
 Laval, Lottin de, 71, 73, 149–50
 Layard, Austen H., 33–40
 Lerner, Judith, 90, 113–14, 116–17, 125
 Lesueur, Charles-Louis, 77–8
 London, 17, 20, 151
 Longpérier, Adrien, 32, 54
 Louvre Paris, 43–6, 71, 77–80, 136, 170–2
 Lucas, Alfred, 51–2, 151
- Matannan, 176
 Matezziš, 61
 Mausoleum of Halicarnassus, 56, 180
 Melucco Vaccaro, Alessandra, 145–6
 De Morgan, Jacques, 91, 172
 De Mecquenem, Robert, 83, 85, 91, 119, 184
 Mumbai, India, 209
 Muller, Émile, 77–8
- Nādin-a/i, weaver of colored cloth at
 Uruk under Darius, 23
 Nasr ed-Din Shah, 79
 New York, Metropolitan Museum of Art, 79, 93,
 99, 151, 180
 Nimrud, present day Kalhu, Iraq, 38–42, 46–7, 179
- Nineveh, 32, 34–42, 49, 55, 71
 Nisa, Turkmenistan, 203
 Nylander, Carl, 15, 128, 175, 177, 196–7, 216
- Old Persian, 190–1, 198
 Oriental Institute, *see* University of Chicago
- painters,
 – bowls, 124–7, 175–6
 – textual evidence of, 27–30, 175–8, 203
 see also women, as painters
- Parnakka, 181
 Pasargadae, 60, 142, 196
 Persepolis, West, 178, 185
 Petra, Jordan, 179
- pigments,
 – analysis of, 90, 125, 142, 219
- Pillet, Maurice, 91–2
 Place, Victor, 32, 43–5, 178–9
 Polybius, 64
- Qal-e Kali, 120–1
 Qal-e Dukhtar, near Firuzabad, 203
 Qajar art, polychromies, 211–14
- Rahsaz, Hassan, 136–7, 159
 Rathgen Research Laboratory, Berlin, 14,
 153–4
 Ravanbod, Hossein, 156
 Reza Shah, 209–11
 Rio De Janeiro, Brazil, 206
- Safavid Dynasty, 11, 65, 67–8
 Sami, Ali, 157
 Sargon II, 107
 Sarre, Friedrich, 151
 Sasanian polychromies, 10, 11, 119, 203,
 211
 Schmidt, Erich, 16, 26, 63, 71, 89, 92–3, 98–9,
 102, 115, 120, 122–34, 155–6, 166, 183–4,
 188, 199
 Scientific Institute of Takht-e Jamshid, 157
 Seleucid, 62–3
 Semper, Gottfried, 36, 56, 179
 Shahbazi, Shapur A., 158–9
 Shahnameh, 10
 Shiraz, 209
 Sidon, 26
 Smithsonian Institution, 1, 3, 14
 Sorsoe, Rey, 212
 squeezes, 129–32, 152–4
 Speyer, 200, 204–5
 Strabo, 31, 186
 Susa, 26, 92, 172, 175, 183–4, 186–8
- Taq-e Bustan, 10, 30, 211, 214
 Tajvidi, Akbar, archaeologist and painter, 89, 120,
 144

- Tatarli, 15
 Texier, Charles, 58, 69–72
 Tilia, Ann Britt and Giuseppe, 90, 111, 216–17
 Tirazziš, 61
 Tol-e Ajori, 129
 Trasati, Franco, 113

 Udvada, India, 209
 ultramarine, 154
 UNESCO, world heritage site, 62, 158, 205
 University of Chicago, Institute for the Study of Ancient Cultures, 4–5, 89, 92, 97, 140, 161–3, 192
 Uruk, 10, 23

 virtual reconstructions, 204–6

 Washington, DC, 47–8, 132
 see also Hall of the Ancients; Smithsonian Institution
 Weld-Blundell, Herbert, 85–7, 127, 150
 Wharton, Glenn, 11–12
 women, as painters, 29, 203

 Xerxes I, 48
 – polychromy on tomb façade, 137
 Xvarnah, “brilliance”, 12

 Zanjan, salt mines *see* Douzlakh
 Zissawis, 181

