

The 9th Conference of the International
Committee for the Conservation of
Mosaics, Hammamet, Tunisia,
November 29–December 3, 2005

Lessons Learned: Reflecting on the Theory and Practice of Mosaic Conservation



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Practice of Mosaic Conservation**

**Leçons retenues :
Les enseignements tirés des expériences
passées dans le domaine de la
conservation des mosaïques**

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Proceedings of the 9th ICCM Conference
Hammamet, Tunisia, November 29–December 3, 2005

Actes de la 9^e Conférence de l'ICCM
Hammamet, Tunisie, 29 novembre–3 décembre 2005

*Edited by Aïcha Ben Abed, Martha Demas,
and Thomas Roby*

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Martha Demas et Thomas Roby*

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Foreword

The triennial conferences of the International Committee for the Conservation of Mosaics (ICCM) have been an essential source of information for professionals about mosaic conservation since the ICCM's founding in 1977. We are pleased to augment this distinguished tradition with the publication of the proceedings of the 9th ICCM Conference, held in Hammamet, Tunisia, November 29–December 3, 2005.

The 9th ICCM Conference was co-organized by the Institut National du Patrimoine (INP) of Tunisia and the Getty Conservation Institute (GCI), with the support of ICCROM (International Centre for the Study of the Preservation and Restoration of Cultural Property) and the University of Cyprus. The theme of the conference was “Lessons Learned: Reflecting on the Theory and Practice of Mosaic Conservation,” and the four-day program included more than sixty papers and posters by professionals in the conservation of ancient mosaics and art historians and archaeologists of the Roman world. The organization of the conference in Tunisia was supported by His Excellency Mohamed El Aziz Ben Achour, Minister of Culture, and facilitated by the Agence de Mise en Valeur du Patrimoine et de Promotion Culturelle (National Agency for the Promotion of Cultural Patrimony) and the National Tourism Office.

The location of the conference, in Tunisia, provided an opportunity to attract participants from countries in the Middle East and North Africa, places that are rich in mosaic heritage but whose professionals have not been well represented at ICCM conferences. To make the most of this opportunity, the Getty Foundation awarded the ICCM a grant that enabled the participation of forty-nine professionals from these regions. We are grateful to the University of Cyprus, through the good offices of Demetrios Michaelides, for administering the grant

on behalf of the ICCM. As a result of this participation, two members from Arabic-speaking countries were elected to the board of the ICCM at the end of the conference. Although the languages in official use during the conference were limited to French and English, an Arabic translation of the abstracts was made available by ICCROM through the support of its director-general, Nicholas Stanley-Price.

The fruitful partnership among the organizers of the 9th conference builds on many years of cooperation. The GCI and the INP have long collaborated to promote the conservation of ancient mosaics through training, documentation, and publication initiatives. The INP hosted the second meeting of the ICCM, in 1978, and under the leadership of the ICCM's president since 1996, Demetrios Michaelides, the GCI partnered with the University of Cyprus on the 6th ICCM Conference, held in Nicosia, Cyprus, in 1996. The INP and the GCI owe special gratitude to Dr. Michaelides, Aïcha Ben Abed, and Jeanne Marie Teutonico for their support of the partnership and their active engagement in the organization of the 9th Conference.

An enriching complement to the conference sessions was a program of visits to mosaic sites in Tunisia organized by the INP. These visits allowed participants to see the sites firsthand and to confront the many realities of conserving and managing mosaics in different cultural, environmental, and social contexts. The participants visited the sites of Thuburbo Majus, Jebel Oust, Neapolis, and Carthage and attended a magnificent reception at the Bardo Museum in Tunis, which houses the world's largest collection of ancient mosaics. At Thuburbo Majus, Jebel Oust, and Neapolis participants were able to meet and view the work of the mosaic maintenance technicians (undergoing training in Tunisia by the INP and the GCI). The new regional archaeological museum in Nabeul offered the opportunity to

view the splendid figurative mosaics, which had been removed from the site many years ago following its excavation.

The conference ended with an optional three-day tour of mosaic sites in Libya, which was an exceptional opportunity to experience the scale and extraordinary artistic and historic significance of Libya's archaeological heritage. The tour included visits to the Archaeological Museum in Tripoli and the ancient cities of Sabratha and Leptis Magna, as well as to Villa Silene and other sites normally closed to the public. We are grateful to Dr. Giuma Anag, director of Libya's Department of Antiquities, for facilitating access to these sites.

The proceedings of the 9th ICCM Conference reflect the breadth and diversity of issues and perspectives that have

come to characterize mosaic conservation. We express our gratitude to the volume editors for shepherding these proceedings through to publication.

TIMOTHY P. WHALEN

Director

The Getty Conservation Institute

MOHAMMED BÉJI BEN MAMI

Director-General

Institut National du Patrimoine, Tunisia

Avant-propos

Les conférences triennales du Comité International pour la Conservation des Mosaïques (ICCM) constituent, depuis la création de l'ICCM, en 1977, une source essentielle d'information pour les professionnels sur la conservation des mosaïques. C'est avec satisfaction que nous poursuivons cette tradition bien établie en y ajoutant la publication des actes de la 9^e Conférence de l'ICCM, tenue à Hammamet, en Tunisie, du 29 novembre au 3 décembre 2005.

La 9^e Conférence a été organisée conjointement par l'Institut National du Patrimoine (INP) de Tunisie et l'Institut Getty de Conservation (GCI) avec le soutien de l'ICCROM (Centre International d'Études pour la Conservation et la Restauration des Biens Culturels) et de l'Université de Chypre. La conférence a eu pour thème « Leçons retenues : Les enseignements tirés des expériences passées dans le domaine de la conservation des mosaïques » et le programme de quatre jours comprenait plus de soixante communications et posters présentés par des professionnels du domaine de la conservation des mosaïques anciennes ainsi que des historiens de l'art et des archéologues du monde romain. Son Excellence Mohamed El Aziz Ben Achour, Ministre de la Culture, a accordé son soutien à l'organisation de la conférence en Tunisie et celle-ci a été facilitée par l'Agence de Mise en Valeur du Patrimoine et de la Promotion Culturelle ainsi que par l'Office National du Tourisme.

La tenue de la conférence en Tunisie a été l'occasion d'encourager la participation des pays du Moyen-Orient et d'Afrique du Nord, des régions qui possèdent un riche patrimoine culturel mais dont les professionnels n'ont pas été suffisamment représentés aux conférences de l'ICCM. Afin d'optimiser cette opportunité, la Fondation Getty a accordé une subvention à l'ICCM qui a permis la participation de

quarante-neuf professionnels provenant de ces régions. Nous sommes reconnaissants à l'Université de Chypre, et particulièrement à Demetrios Michaelides, d'avoir bien voulu gérer cette subvention au nom de l'ICCM. Cette participation a eu pour résultat l'élection de deux membres provenant de pays arabophones au bureau de l'ICCM à la fin de la conférence. Si les langues de la conférence ont été limitées au français et à l'anglais, une traduction en arabe des résumés a été prise en charge par l'ICCROM grâce au soutien de son Directeur général, Nicholas Stanley-Price.

Le partenariat fructueux entre les organisateurs de la 9^e Conférence repose sur plusieurs années de coopération. Le GCI et l'INP collaborent depuis de nombreuses années pour promouvoir la conservation des mosaïques anciennes à travers des initiatives de formation, de documentation et de publication. L'INP a accueilli la deuxième réunion de l'ICCM en 1978 et, sous la direction du président de l'ICCM depuis 1993, Demetrios Michaelides, le GCI a organisé en partenariat avec l'Université de Chypre la 6^e Conférence de l'ICCM à Nicosie, Chypre, en 1996. L'INP et le GCI sont particulièrement reconnaissants au Dr Michaelides, Aïcha Ben Abed et Jeanne Marie Teutonico pour le soutien qu'ils ont apporté à ce partenariat et pour leur engagement actif dans l'organisation de la 9^e Conférence.

Les sessions de la conférence ont été enrichies par un programme de visites aux sites comportant des mosaïques, organisé par l'INP. Ces visites ont permis aux participants de prendre connaissance des sites et de constater personnellement les multiples réalités de la conservation et de la gestion des mosaïques dans des contextes culturels, environnementaux et sociaux différents. Des visites ont été organisées aux sites de Thuburbo Maius, Jebel Oust, Neapolis et Carthage et les

participants ont assisté à une magnifique réception au Musée du Bardo de Tunis, qui renferme la plus grande collection de mosaïques anciennes au monde. A Thuburbo Maius, Jebel Oust et Neapolis, les participants ont pu rencontrer et observer le travail des techniciens d'entretien des mosaïques (formés en Tunisie par l'INP et le GCI). Le nouveau Musée archéologique régional à Nabeul a permis aux participants de découvrir les magnifiques mosaïques figurées qui avaient été transférées hors du site après les fouilles il y a de nombreuses années.

La conférence s'est achevée avec une visite facultative de trois jours en Libye. Cette visite a constitué une occasion unique de constater l'ampleur et l'importance artistique et historique du patrimoine archéologique libyen. Ce tour comprenait des visites au Musée archéologique à Tripoli, aux cités antiques de Sabratha et Leptis Magna, ainsi qu'à la Villa Silène et autres sites normalement fermés au public. Nous

sommes reconnaissants au Dr Giума Anag, directeur du Département des Antiquités de Libye, pour nous avoir facilité l'accès à ces sites.

Les Actes de la 9^e Conférence de l'ICCM reflètent l'étendue et la diversité de la problématique et des perspectives qui désormais caractérisent la conservation des mosaïques. Nous exprimons nos remerciements aux rédacteurs de ce volume pour avoir mené à bien la publication de ces actes.

TIMOTHY P. WHALEN
Directeur
Institut Getty de Conservation

MOHAMMED BÉJI BEN MAMI
Directeur général
Institut National du Patrimoine de Tunisie

Acknowledgments

The successful organization of the 9th ICCM Conference and the publication of the proceedings were the result of the efforts and dedication of many individuals. In the planning stage, the ICCM Scientific Committee of the Board (Demetrios Michaelides, Jeanne Marie Teutonico, Roberto Nardi, Évelyne Chantriaux, and John Stewart) provided their time and expertise in conceptualizing the themes of the conference and selecting papers.

In Tunisia, through the support of the INP's director, Mohammed Béji Ben Mami, INP staff Saloua Zangar, Fathi Bejaoui, Habib Ben Younes, Tahar Ghalia, Mounir Fantar, and Féthi Chelbi took an active role in the conference arrangements and visits to mosaic sites and museums. Archaeologist Jean-Pierre Darmon provided his insights, acquired through many years of experience, during site visits. INP mosaic maintenance technicians also contributed to the site visits by demonstrating techniques and results of their mosaic work.

Kathleen Louw (GCI) skillfully took on the onerous task of coordinating the conference arrangements and the postconference tour. She was ably assisted in the preparatory stages by Niki Savvides on behalf of the ICCM and the University of Cyprus; and in Tunisia, by INP staff Lotfi Cherif, Lotfi Kahloun, Mohamed Charfa, Hamdi Dridi, Fatma Ghanem, and Habiba Chebil, and GCI staff and consultants Niki Savvides, Elsa Bourguignon, Sibylla Tringham, and Kenza Kahrin.

Conference interpreters Anne-Marie Driss, who also translated the preconference abstracts, Mohamed Ali Ben

Yedder, and Mourad Boulares expertly facilitated communication between French and English. Elsa Bourguignon, Sibylla Tringham, Niki Savvides, and Kenza Kahrin acted as session rapporteurs and provided summary points for inclusion in the final presentation.

Kathleen Louw and Cynthia Godlewski undertook coordination of the proceedings for the GCI, and Tevvy Ball and Pamela Heath managed the project and coordinated production, respectively, for Getty Publications. Gary Hespenheide guided the design of the book. Elsa Bourguignon assisted with editing the discussion transcripts. Preliminary editing of papers was done by Anne Kurashige; final copyediting of the entire proceedings volume was undertaken by Sheila Berg (English) and Sabine de Valence (French). The summaries and introductory material were translated from English and French by Anne-Marie Driss.

On behalf of the GCI and the INP, we express our sincere thanks to all these individuals for their contributions to bringing the conference and its publication to a rewarding completion.

AÏCHA BEN ABED
MARTHA DEMAS
THOMAS ROBY

Remerciements

La réussite de l'organisation de la 9^e Conférence de l'ICCM ainsi que la publication des actes ont été réalisées grâce à l'engagement et aux efforts de nombreuses personnes. Au cours de la phase de planification, le Comité scientifique du Bureau (Demetrios Michaelides, Jeanne Marie Teutonico, Roberto Nardi, Évelyne Chantriaux et John Stewart) ont consacré à la fois leur temps et leur compétence à la conceptualisation des thèmes de la conférence ainsi qu'au choix des communications.

En Tunisie, grâce au soutien de son directeur, Mohammed Béji Ben Mami, les cadres de l'INP, Saloua Zangar, Fathi Bejaoui, Habib Ben Younes, Tahar Ghalia, Mounir Fantar et Féthi Chelbi, ont participé activement à la préparation de la conférence et des visites aux sites à mosaïques et aux musées. L'archéologue Jean-Pierre Darmon a partagé ses connaissances approfondies, acquises après de nombreuses années d'expérience, pendant les visites sur le terrain. Les techniciens d'entretien des mosaïques de l'INP ont également contribué aux visites sur les sites en fournissant une démonstration des techniques et des résultats de leur travail sur les mosaïques.

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que par le personnel du GCI et les consultants Niki Savvides, Elsa Bourguignon, Sibylla Tringham et Kenza Kahrim.

Les interprètes de conférences Anne-Marie Driss, qui a également traduit les résumés pré-conférence, Mohamed Ali Ben Yedder et Mourad Boulares, ont facilité avec compétence la communication entre le français et l'anglais. Elsa Bourguignon, Sibylla Tringham, Niki Savvides et Kenza Kahrim ont assumé le rôle de rapporteur de séance en rédigeant les résumés pour inclusion dans la présentation finale.

Kathleen Louw et Cynthia Godlewski ont assuré la coordination des Actes pour le GCI et Tevvy Ball et Pamela Heath ont respectivement géré le projet et la coordination de la production pour le service des publications du Getty. Gary Hespeneide a dirigé la conception du livre. Elsa Bourguignon a fourni son assistance pour la mise en forme de la transcription des débats. Le travail éditorial préliminaire des communications a été fait par Anne Kurashige ; le travail éditorial final sur l'ensemble des Actes a été assuré par Sheila Berg (anglais) et Sabine de Valence (français). Les résumés et textes introductifs ont été traduits de l'anglais et du français par Anne-Marie Driss.

Au nom du GCI et de l'INP, nous tenons à exprimer nos sincères remerciements à toutes ces personnes pour leur contribution à la réussite de la conférence et de cette publication.

AÏCHA BEN ABED
MARTHA DEMAS
THOMAS ROBY

Opening Remarks of the President of the ICCM on the Occasion of the 9th Conference

In the three years since the 8th ICCM Conference, in Thessaloniki, Greece (2002), more has been achieved by the ICCM than ever before in its history. It is heartening and encouraging to see how much has been accomplished, especially considering that the ICCM has little steady funding and everything is done on a voluntary basis. Since Thessaloniki, the proceedings of three conferences have appeared. In fact, we are now entirely up to date with our publications. First, there was the long-overdue publication of the 6th ICCM Conference, in Nicosia, Cyprus. Thanks to the offer of assistance from Nicholas Stanley-Price, director-general of ICCROM and board member of our committee, the volume appeared in 2003. Then came the proceedings of the 7th ICCM Conference, held in Arles and Saint-Romain-en-Gal, France, in 1999. Due to the hard work of our board member Patrick Blanc, in collaboration with Véronique Blanc-Bijon, Évelyne Chantriaux, and Marie-Laure Courboulès, the proceedings of that conference were also published in 2003. Finally, another of our board members, Charalambos Bakirtzis, has managed to get the proceedings of the 8th ICCM Conference published in time for the Tunisia conference—a real achievement.

Another milestone has been the creation of an official ICCM Web site, www.iccm.pro.cy. Thanks to the assistance of Niki Savvides and technical support from the University of Cyprus, this long-overdue public face of the ICCM has been achieved. We hope this will serve as a means of outreach to the larger conservation community and the general public, as well as an important source of information to our membership. But beware: memorize the address, because a search for ICCM on the Internet will lead to, among other sites, the International Center for Cosmetic Medicine, the International Congress on Cognitive Modelling, the International Congress of Chinese

Mathematics, and the Institute of Cemetery and Cremation Management!

The creation of the Web site was one step toward giving the ICCM a more permanent and official character, which was one of the recommendations of the Thessaloniki conference. The next step in the same direction was the official registration of the ICCM as an organization with legal status. The committee was founded in 1977, and not having legal status did not matter so much at the beginning, when membership was moderate and our activities limited. With improvement in both these directions, however, and with stricter controls on international financial transactions, it became imperative to settle this matter. After exploring several alternatives with board members, all of which proved legally and financially problematic, I moved forward with registering the ICCM on the Cyprus Register of Companies. This now provides full legal status for the ICCM as a nonprofit organization with the ability to open an account to receive and disburse funds.

Attendance at the ICCM conferences has been building steadily over the years, and these meetings have become one of the most important international forums for the discussion of all issues related to mosaic conservation. The Tunisia conference is, in fact, the largest conference ever, with 244 participants representing thirty countries. This is the best proof of the ICCM's success.

No doubt the location of the meeting in Tunisia, a country with an enviable cultural heritage, especially in ancient mosaics, has encouraged participation. For this I would like to thank the Institut National du Patrimoine and its director-general, Mohammed Béji Ben Mami, as well as our board member Aïcha Ben Abed, for undertaking to host this meeting and encouraging participation from the Maghreb and

North Africa as a whole, a region that hitherto was poorly represented at our conferences. Although this is the first of our international conferences to take place in Tunisia, the involvement of this country with the ICCM goes back to the very beginnings of the organization. Tunisia has always been represented on the board, first by Mongi Ennaïfer and since 1992 by Aïcha Ben Abed. Through them and the support of the Institut National du Patrimoine, Tunisia hosted the second meeting of the ICCM, in 1978, and two meetings of the board, combined with Roundtables, in 2001 and 2004. I am delighted that this long collaboration has continued with the 9th conference.

Another agent without which this meeting would not have been possible is the Getty Conservation Institute, which I would like to thank in the person of its director, Timothy Whalen, and its associate director and ICCM board member, Jeanne Marie Teutonico. The GCI's role in the organization of this conference has been invaluable. The éminence grise in this affair is Martha Demas, senior project specialist at GCI, who, whether from Los Angeles or China, has been involved with and kept a watchful eye on every step in the organization process. Kathleen Louw, senior project coordinator, has taken most of the brunt of the organization and logistics of this conference, and I am grateful to her for doing a superb job. I also thank the GCI for supporting Niki Savvides, who assisted me during the organization of this conference. Niki has been my right hand over the past few months. My infinite thanks go to all of them for their good work.

As in the past, the spiritual mother of the ICCM, ICCROM, through its director-general, Nicholas Stanley-Price, has given its support, this time by providing the translations of the abstracts into Arabic—most important for this meeting taking place in North Africa.

I would like to express my deep gratitude to the Getty Foundation for giving us a generous grant, with which it has been possible to invite a considerable number of colleagues from the Arab-speaking world (both North Africa and the Near East) and from Turkey. It is wonderful to have such good representation from many countries that were either under-represented or not represented at all at previous conferences.

Finally, I wish to acknowledge the contribution of the University of Cyprus, which provided all office and equipment support for the ICCM Secretariat and, above all, agreed to manage the grant money without overhead charges.

The theme of this year's conference is "Lessons Learned." After twenty-eight years of discussions and conferences on specific themes, the time was ripe for casting a look backward and reflecting on what has been happening, both in theory and in practice, during all these years in the world of mosaic conservation. We have a stimulating program in front of us, with some forty-five papers, twenty-five posters, and three video presentations. But don't worry; there is plenty of fun, too. Thanks to our hosts, you will enjoy some superb receptions that, judging by my past experience, will be truly unforgettable. And there are also the excursions to Thuburbo Majus, Jebel Oust, Neapolis, Carthage, and the mythical Bardo Museum.

I wish you all a most profitable and enjoyable stay in Tunisia and, above all, thank you all for coming and supporting the work of the ICCM.

DEMETRIOS MICHAELIDES
 President, International Committee for the
 Conservation of Mosaics
 November 29, 2005

Allocution d'ouverture du Président de l'ICCM à l'occasion de la 9^e Conférence

Au cours des trois années qui se sont écoulées depuis la 8^e Conférence de l'ICCM tenue à Thessalonique, Grèce (2002), l'ICCM a accompli plus qu'il n'a jamais fait auparavant. C'est à la fois rassurant et encourageant de constater ce qui a été accompli, sachant notamment que l'ICCM ne dispose pas d'un financement régulier conséquent et que tout est basé sur le volontariat. Depuis Thessalonique, les actes de trois conférences ont été publiés et nous sommes maintenant à jour avec nos publications. Tout d'abord a paru la publication tant attendue des actes de la 6^e Conférence à Nicosie, Chypre. Grâce à l'offre d'aide de Nicholas Stanley-Price, Directeur général de l'ICCROM et membre du bureau de notre comité, le volume est paru en 2003. Puis ce fut le tour des actes de la 7^e Conférence de l'ICCM tenue à Arles et Saint-Romain-en-Gal, France, en 1999. Grâce aux efforts considérables du membre de notre bureau, Patrick Blanc, en collaboration avec Véronique Blanc-Bijon, Évelyne Chantriaux et Marie-Laure Courboulès, les actes de cette conférence ont été publiés en 2003. Finalement, un autre membre de notre bureau, Charalambos Bakirtzis, a réussi à assurer la publication des actes de la 8^e Conférence à temps pour la conférence, véritable tour de force.

La création du site web officiel de l'ICCM (www.iccm.pro.cy) a marqué une autre étape importante. Grâce à l'aide de Niki Savvides et au soutien technique de l'Université de Chypre, cette vitrine publique de l'ICCM est enfin devenue réalité. Nous espérons que ce site constituera le moyen de s'ouvrir plus largement sur la communauté de la conservation ainsi que sur le grand public, et s'avérera une source d'information importante pour nos membres. Seulement, veillez à bien vous souvenir de l'adresse car si vous faites une recherche sur l'Internet pour trouver le site de l'ICCM vous

allez vous retrouver, entre autres, sur le Centre international pour la médecine cosmétique, le Congrès international de la modélisation cognitive, le Congrès international des mathématiques chinoises et l'Institut pour la gestion des cimetières et de la crémation !

La création du site Web marque un pas en avant dans nos efforts pour doter l'ICCM d'un caractère plus permanent et officiel, conformément à une des recommandations de la conférence de Thessalonique. L'étape suivante a été l'enregistrement de l'ICCM pour lui donner un statut juridique. Le comité a été fondé en 1977, et au départ l'absence de statut juridique importait peu car les membres n'étaient pas nombreux et les activités étaient limitées. Cependant, ces deux aspects ont évolué avec le temps et de plus, les contrôles sont devenus beaucoup plus stricts en matière de transactions financières internationales. Il est donc devenu urgent de trouver une solution. Après avoir étudié, avec les membres du Bureau, les différentes possibilités qui posaient toutes des difficultés juridiques et financières, j'ai décidé d'enregistrer l'ICCM au registre des sociétés de Chypre.

L'ICCM dispose désormais d'un statut juridique en tant qu'organisation à but non lucratif qui lui permet d'ouvrir un compte pour recevoir et déboursier des fonds.

La participation aux conférences de l'ICCM augmente régulièrement et ces réunions constituent désormais un des forums les plus importants pour discuter des problématiques liées à la conservation des mosaïques. Cette conférence en Tunisie est en effet la plus importante de toutes, avec 244 participants représentant trente pays. C'est bien la preuve du succès de l'ICCM.

Il est certain que le fait que la réunion se tienne en Tunisie, pays au riche patrimoine culturel, tout particulièrement en ce

qui concerne les mosaïques anciennes, a encouragé cette participation. A cet égard, je tiens à remercier l'Institut National du Patrimoine et son Directeur général, Mohammed Béji Ben Mami, ainsi qu'Aïcha Ben Abed, membre de notre bureau, pour avoir entrepris d'accueillir cette réunion et encouragé la participation de l'Afrique du Nord dans son ensemble, région qui jusqu'ici n'était pas bien représentée à nos conférences. Même si cette conférence est la première de nos conférences internationales à être organisée en Tunisie, l'implication de ce pays dans les travaux de l'ICCM remonte aux tous débuts de l'organisation. La Tunisie a toujours été représentée au sein de notre bureau, d'abord par Mongi Ennaïfer et depuis 1992 par Aïcha Ben Abed. Grâce à eux et au soutien de l'Institut National du Patrimoine, la Tunisie a accueilli la deuxième réunion de l'ICCM, en 1978, et deux réunions du bureau en même temps que des tables rondes, en 2001 et 2004. Je me réjouis que cette longue collaboration se poursuive avec la 9^e Conférence.

Une autre organisation sans laquelle cette réunion n'aurait pas été possible est l'Institut Getty de Conservation, que je tiens à remercier à travers son directeur Timothy Whalen et son directeur associé et membre du Bureau de l'ICCM, Jeanne Marie Teutonico. Le rôle du GCI dans l'organisation de cette conférence a été primordial. Martha Demas, spécialiste de projet en chef auprès du GCI, est l'éminence grise dans cette affaire et, que ce soit de Los Angeles ou de Chine, elle s'est impliquée et a surveillé chaque étape du processus d'organisation. Kathleen Louw, coordinatrice de projet en chef, s'est chargée d'une grande partie de l'organisation logistique de cette conférence et je lui suis reconnaissant pour le travail formidable qu'elle a fait. Je souhaite également remercier le GCI pour le soutien apporté à Niki Savvides, qui m'a aidé pour l'organisation de ce congrès. Niki a été mon bras droit au cours des derniers mois. Je les remercie tous pour leur travail remarquable.

Comme par le passé, la mère spirituelle de l'ICCM, l'ICCROM, à travers son Directeur général, Nicholas Stanley-

Price, a apporté son soutien, cette fois en fournissant la traduction des résumés en arabe, essentiel pour cette réunion en Afrique du Nord.

Je souhaiterais exprimer ma profonde reconnaissance à la Fondation Getty pour nous avoir octroyé une généreuse subvention qui nous a permis d'inviter un nombre important de collègues du monde arabophone (aussi bien d'Afrique du Nord que du Proche-Orient) et de Turquie. Nous nous réjouissons de voir une représentation aussi large de plusieurs pays qui auparavant étaient soit sous-représentés soit pas représentés du tout à nos conférences.

Enfin, je souhaiterais noter la contribution de l'Université de Chypre, qui nous a fourni tout le soutien matériel pour le Secrétariat de l'ICCM et surtout, s'est chargée de gérer la subvention sans prélever de frais.

Le thème de la conférence cette année est « Leçons retenues ». Après vingt-huit ans de discussions et de conférences sur des thèmes spécifiques, le temps est venu de regarder en arrière et de réfléchir sur l'évolution qui a eu lieu, au cours de ces années dans le monde de la conservation des mosaïques, du point de vue de la théorie et de la pratique. Un programme stimulant nous attend : environ quarante-cinq présentations, vingt-cinq posters et trois présentations vidéos. Mais ne vous inquiétez pas, nous allons également nous distraire. Grâce à nos hôtes, vous allez assister à de superbes réceptions qui, si je me réfère à mon expérience, seront inoubliables. Nous aurons également une excursion à Thuburbo Maius, Jebel Oust, Neapolis, Carthage, et au mythique Musée du Bardo.

Je vous souhaite tous un séjour intéressant et agréable en Tunisie et surtout, vous remercie tous d'être venus soutenir le travail de l'ICCM.

DEMETRIOS MICHAELIDES
Président, Comité International pour
la Conservation des Mosaïques
29 novembre 2005

Introduction

Aïcha Ben Abed, Martha Demas, and Thomas Roby

The theme of the 9th ICCM Conference in Tunisia was “Lessons Learned: Reflecting on the Theory and Practice of Mosaic Conservation.” It seemed appropriate that after almost thirty years of ICCM conferences, the mosaic conservation field should look back on its experiences and begin to draw conclusions about what has been accomplished and where the field needs to go to improve conservation of our ancient mosaic heritage. To this end, the organizers sought papers that would reflect on theory and practice, addressing how and why they have changed and what has been learned over the years, or present results of an evaluation of the many aspects of mosaic conservation: documentation, training, site management, maintenance, in situ conservation treatments, lifting and re-laying, and interventions such as sheltering and reburial.

The four days of conference papers were organized according to seven subthemes, which have been retained in this publication of the conference proceedings: Evaluating Mosaic Practice, Caring for Mosaics in Museums, Documenting and Assessing Sites at Risk, Managing Sites with Mosaics, Sheltering Mosaics, Training of Conservation Practitioners, and Case Studies, in which specific interventions or projects were presented. The discussions following each theme, which animated the conference and provided valuable insights, have been edited for clarity but otherwise remain unchanged.¹ Sixteen posters presented at the conferences have also been incorporated in the proceedings. The main points that emerged in the themed sessions were summarized in the closing session of the conference and are included here as Part Eight, Summary Conclusions and Recommendations.

The conference, which invited reflection on mosaic conservation as practiced over the past several decades, did

not always achieve the hoped-for level of analysis and critical evaluation. It did, however, bring to the fore the great strides that have been made in the field of mosaic conservation, as well as the weaknesses that remain to be addressed. The keynote speech, by Gaël de Guichen and Roberto Nardi, surveyed the history and development of mosaic conservation over the past fifty years. In the half century since it began to emerge as a distinct field of endeavor, mosaic conservation has broadened its scope and deepened its awareness of the mosaic in its context, the need for holistic planning, the types of training required for managing and conserving sites with mosaics, and the importance of documentation and compatible treatment materials, in particular the use of lime.

The ICCM conferences have been instrumental in effecting the theoretical shift from conservation of mosaics by detachment to conservation in situ. The divisions of the past between those who practiced conservation through lifting of mosaics and those who advocated in situ conservation have diminished, as practitioners have come to accept that lifting should happen much less often than it still does but that in certain instances it is the last and only option for the future conservation of a mosaic. As pointed out in the session on documenting and assessing sites at risk, some of those circumstances—mainly in the form of development pressures and looting—are unfortunately still prevalent and even increasing in many countries. Nevertheless, it is a true sign of maturation that the discourse on mosaic conservation has been able to move beyond the in situ/ex situ debate to a more nuanced approach to decision making in which an assessment of the mosaic’s significance, its physical condition, and its management context are considered.

Despite the change in attitude in relation to the systematic detachment of mosaics, participants in the session on

caring for mosaics in museums drew attention to the problems that are often faced by museums possessing those mosaics that were detached long ago and frequently relaid on cement support panels or otherwise stored in poor conditions. To ignore this situation means to condemn thousands of mosaics stockpiled both at sites and in museums. The session provided examples of comprehensive assessment of museum collections to reverse this situation through new initiatives of conservation, study, and display.

While in situ conservation is now strongly advocated by the profession, the means of achieving it remain problematic for both technical and managerial reasons. As a technical intervention, in situ conservation requires an understanding of the physical condition and the causes of deterioration of mosaics in their original setting and the ability to mitigate the often complex factors at play. A review of the literature on deterioration and treatment presented in the first session revealed that most published work focuses on description of treatments carried out; there is a dearth of comprehensive and systematic accounts of deterioration processes leading to the development and implementation of mitigation strategies.

The lack of evaluation of the effectiveness of previous treatments or preventive measures such as sheltering and reburial of mosaics is another frequently cited issue in the field if we are to achieve a better understanding of what is effective for in situ conservation. It was in part to remedy this situation that the organizers selected the theme of the conference. The response, however, especially with regard to evaluating treatment, was disappointing. One reason may be that practitioners, especially those working in private practice, rarely have the opportunity and means to critically assess prior work.

The session devoted to shelters did include evaluation initiatives that are currently under way, and the case studies and posters dealing with reburial of mosaics attest to the strong interest in these methods. Both sheltering and reburial are important measures for preserving mosaics in situ, but they have different aims and require different management responses. Especially concerning reburial, however, there are divergent opinions about efficacy and appropriateness. It is a topic that warrants further in-depth discussion at future ICCM conferences in order to achieve more informed opinions and consensus.

The importance of context for understanding mosaics and the centrality of mosaics in “making a site,” especially when linked with the growth in tourism to archaeological sites, was highlighted at the 6th ICCM Conference, in Nicosia. While the values that warrant in situ conservation are now

well recognized and advocated, deciding whether a mosaic is lifted or left in situ, and what type of treatment or storage it receives, is equally influenced by the management context in which the site exists. The increasing attention to the role of maintenance and monitoring for successful in situ conservation has been evident in previous ICCM conferences, but to be successful, new profiles of personnel working on sites (from technicians to site managers) and training opportunities are required. Several papers in the training session presented recent initiatives for mosaic conservation technicians in the Middle East and in Tunisia, reflecting the growing recognition that in situ conservation requires personnel with the skills to maintain mosaics in a stable condition. This in turn requires a government authority willing and able to establish the requisite management organization and commit the resources to hire and sustain a corps of conservation technicians and conservators. It was also noted during the training session that there is no coordination among the initiatives, so there is little learning from the experiences of others.

Bringing these assessments of values, physical condition, and management context together in the decision-making process is the role of site management. The need for better site management and sustainable solutions loomed large in many of the presentations at the 9th conference. A common view expressed in the papers from the management session was that the field must address mosaic conservation as an element of overall site management while also taking a more long-term approach to ensure the sustainability of conservation interventions.

An essential aspect of a long-term and sustainable approach to preserving our ancient mosaic heritage in the best possible condition will be for national authorities to establish policies for conservation and public awareness, taking into account their personnel and financial resources. The international community of mosaic conservation professionals will also need to assume a more active role in coordinating the many positive experiences of mosaic conservation carried out in different regions to move the field forward. We feel confident that the publication of the papers from the ICCM conferences is one important step in that direction.

Notes

- 1 The transcripts of the discussions from session 3, Documenting and Assessing Sites at Risk, were unfortunately not recorded due to mechanical failure of the taping equipment.

Introduction

Aïcha Ben Abed, Martha Demas et Thomas Roby

La 9^e Conférence de l'ICCM organisée en Tunisie a eu pour thème « Leçons retenues : Les enseignements tirés des expériences passées dans le domaine de la conservation des mosaïques ». Après près de trente ans de conférences de l'ICCM, il semblait utile de permettre au domaine de la conservation des mosaïques de faire le point sur son expérience passée et de commencer à tirer des conclusions par rapport à ce qui a été réalisé tout en envisageant les orientations qui permettraient d'améliorer la conservation de notre patrimoine de mosaïques anciennes. A cette fin, les organisateurs ont sollicité des communications qui soit proposeraient une réflexion sur la théorie et la pratique, sur la manière et les raisons de leur évolution et sur les leçons retenues au fil des années, soit qui présenteraient les résultats d'une évaluation d'un des nombreux aspects de la conservation des mosaïques : documentation, formation, gestion des sites, entretien, traitements de conservation *in situ*, dépose et repose et interventions tels que les abris et le réenfouissement.

Les quatre jours consacrés à la présentation des communications ont été organisés selon sept sous-thèmes qui ont été retenus également dans cette publication des Actes de la conférence : Évaluation de la pratique des mosaïques, Entretien des mosaïques dans les musées, Documentation et évaluation des sites à risque, Gestion des sites à mosaïques, Mise sous abri des mosaïques, Formation des praticiens, et Études de cas, réunissant les interventions spécifiques ou les projets. Les débats faisant suite à chaque thème, animant la conférence en y apportant une réflexion précieuse, ont fait l'objet d'un travail de mise en forme¹ pour assurer davantage de clarté, sans pour autant subir de modification. Les seize posters présentés à la conférence ont également été inclus dans les actes. Les points principaux qui ont émergé des ses-

sions à thème ont été résumés lors de la session de clôture de la conférence et sont présentés ici dans la Partie VIII, Résumé des Conclusions et Recommandations.

La conférence, qui invitait à une réflexion sur la conservation des mosaïques telle que pratiquée au cours des dernières décennies, n'a pas toujours atteint le niveau d'analyse et d'évaluation critique souhaité. Toutefois, elle a mis en évidence les progrès accomplis dans le domaine de la conservation des mosaïques, ainsi que les faiblesses auxquelles il conviendrait de remédier. Dans leur discours-programme Gaël de Guichen et Roberto Nardi ont passé en revue cinquante ans d'histoire et d'évolution de la conservation des mosaïques. Pendant ce demi-siècle, depuis que le domaine a commencé à affirmer sa spécificité, la conservation des mosaïques a élargi son champ d'application et approfondi sa prise de conscience de la mosaïque dans son contexte, du besoin d'adopter une planification globale, des types de formation nécessaires pour gérer et conserver les sites à mosaïques, et de l'importance de la documentation et des matériaux de traitement compatibles, en particulier l'utilisation de la chaux.

Les conférences de l'ICCM ont joué un rôle décisif pour opérer un changement de cap théorique et passer de la conservation des mosaïques par dépose vers la conservation *in situ*. Les divisions qui existaient entre ceux qui pratiquaient la conservation en déposant les mosaïques et ceux qui prônaient la conservation *in situ* ont diminué. Les praticiens ont commencé à accepter que le recours à la dépose ait lieu beaucoup moins souvent mais que dans certains cas cela puisse constituer la dernière et unique option pour la conservation d'une mosaïque. Comme il a été dit lors de la session sur la documentation et l'évaluation des sites à risques, certaines circonstances – principalement des pressions dues au

développement ou au pillage – subsistent malheureusement toujours et gagnent même de l'ampleur dans de nombreux pays. Cependant, c'est un véritable signe de maturation que le discours sur la conservation des mosaïques ait pu dépasser le simple débat pour préparer une prise de décisions beaucoup plus nuancée tenant compte de l'évaluation de l'importance de la mosaïque, de son état matériel et du contexte de sa gestion.

Malgré l'évolution des attitudes par rapport à la dépose systématique des mosaïques, les participants à la session sur l'entretien des mosaïques dans les musées ont attiré l'attention sur les problèmes auxquels font souvent face les musées qui abritent des mosaïques déposées depuis longtemps et souvent reposées sur des supports en ciment ou alors stockés dans de mauvaises conditions. Ne pas reconnaître cette situation signifie la condamnation de milliers de mosaïques stockées à la fois sur les sites et dans les musées. Les sessions ont proposé des exemples d'évaluations complètes de collections de musées pour remédier à cette situation à travers des nouvelles initiatives de conservation, étude et exposition.

Si la conservation *in situ* est à présent fortement préconisée par la profession, les moyens d'y parvenir demeurent problématiques pour des raisons à la fois techniques et de gestion. En tant qu'intervention technique, la conservation *in situ* nécessite une connaissance de l'état matériel et des causes de détérioration des mosaïques dans leur cadre d'origine et la capacité d'atténuer les facteurs souvent compliqués qui entrent en jeu. Une étude de la documentation sur la détérioration et les traitements présentée au cours de la première session a montré que la majorité des travaux publiés sont consacrés à la description des traitements effectués ; il existe peu de comptes rendus complets et systématiques des processus de détérioration qui conduisent au développement et à la mise en œuvre de stratégies d'atténuation.

Le manque d'évaluation de l'efficacité des traitements précédents, ou des mesures préventives telles que la mise sous abri ou le réenfouissement des mosaïques est souvent évoqué. Cela permettrait une meilleure compréhension des approches les plus efficaces pour la conservation *in situ*. C'est en partie pour remédier à cette situation que les organisateurs ont choisi le thème de la conférence. Toutefois, la réponse, particulièrement en ce qui concerne l'évaluation des traitements, a été décevante. Cela pourrait s'expliquer, entre autres, par le fait que les professionnels, notamment privés, ont rarement l'occasion ou les moyens d'entreprendre une évaluation critique des travaux précédents.

La session consacrée aux abris a fait état de quelques initiatives en cours en matière d'évaluation et les études de cas et posters se rapportant aux réenfouissements des mosaïques témoignent du grand intérêt porté à ces méthodes. La mise sous abris ainsi que le réenfouissement sont des mesures intéressantes pour préserver les mosaïques *in situ*, mais ils répondent à des objectifs différents et requièrent des mesures de gestion différentes. Notamment en ce qui concerne le réenfouissement, les avis sont partagés sur son efficacité et sa pertinence. C'est un sujet qui mérite d'être davantage approfondi lors des prochaines conférences de l'ICCM afin de permettre des opinions mieux informées et susciter un consensus.

L'importance du contexte pour comprendre les mosaïques et le rôle central des mosaïques qui « font un site », particulièrement en conjonction avec la croissance du tourisme sur les sites archéologiques, sont des aspects évoqués lors de la 6^e Conférence à Nicosie. Alors que les valeurs justifiant la conservation *in situ* sont désormais reconnues et prônées, la décision de savoir si une mosaïque doit être déposée ou laissée *in situ*, et quel type de traitement ou de stockage lui appliquer sont des questions qui sont également influencées par le contexte de gestion du site. L'attention de plus en plus grande accordée à l'entretien et au suivi pour assurer une conservation *in situ* réussie a été évoquée lors des conférences précédentes de l'ICCM mais pour assurer la réussite il est nécessaire de disposer de nouveaux profils de personnel travaillant sur les sites (des techniciens jusqu'aux gestionnaires de site) ainsi que d'opportunités de formation. Lors de la session consacrée à la formation, plusieurs communications ont fait état d'initiatives récentes concernant les techniciens pour la conservation des mosaïques au Moyen-Orient et en Tunisie, reflétant ainsi le constat de plus en plus partagé que la conservation *in situ* requiert un personnel capable de maintenir les mosaïques dans un état stable. Cela exige aussi une autorité de tutelle avec la volonté et la capacité de mettre en place une organisation de gestion adéquate et d'engager les ressources nécessaires pour embaucher et maintenir un corps de techniciens de la conservation et de conservateurs-restaurateurs. Il a également été constaté lors de la session sur la formation qu'aucune coordination existe entre les initiatives, empêchant ainsi la transmission de l'expérience.

Le rôle du gestionnaire de site est de rassembler ces évaluations des valeurs, de l'état physique et du contexte de gestion pour les intégrer dans le processus décisionnel. Plusieurs communications présentées à la 9^e Conférence ont insisté sur la nécessité de mettre en place une meilleure gestion des sites

et de trouver des solutions durables. Lors de la session sur la gestion, il y a eu un accord général pour dire que la conservation des mosaïques doit être considérée comme un élément de la gestion d'un site dans son ensemble tout en adoptant une approche à plus long terme afin d'assurer la durabilité des interventions de conservation.

Un aspect essentiel d'une approche à long terme et durable à la préservation du patrimoine de mosaïques anciennes dans le meilleur état possible serait que les autorités nationales mettent en place des politiques de conservation et sensibilisation du public, en tenant compte de leurs ressources financières et humaines. La communauté internationale des professionnels de la conservation des mosaïques devra aussi

assumer un rôle dans la coordination des nombreuses expériences positives en ce domaine dans différentes régions pour le faire avancer. Nous sommes confiants que la publication des communications des conférences de l'ICCM constitue un pas important dans cette direction.

Notes

- 1 La transcription des débats de la session 3, Documentation et évaluation des sites à risque, n'a malheureusement pas pu aboutir à cause d'un problème technique du matériel d'enregistrement.

PART ONE

Evaluating Mosaic Practice

Mosaic Conservation: Fifty Years of Modern Practice

Gaël de Guichen and Roberto Nardi

Abstract: *The practice of mosaic conservation has evolved significantly over the past several decades. Fifty years ago mosaics were approached as isolated objects, without context, and interventions were undertaken without adequate planning. There were limited options for conservation strategies (detachment was the main option available); the workforce consisted mainly of artisans, craftspersons, or carpenters; and materials were limited to cement, gypsum, or adhesives. This paper reviews the changing philosophy and practice of mosaic conservation, leading to the current state of the art.*

Résumé : *La pratique de la conservation des mosaïques a considérablement évolué au cours des dernières décennies. Il y a cinquante ans, la mosaïque était abordée comme un objet isolé et sans contexte et les interventions étaient effectuées sans planification adéquate. En décidant d'une stratégie de conservation les options étaient très limitées (la dépose constituait l'option principale), les intervenants étaient principalement des artisans tels que les menuisiers et les matériaux se limitaient au ciment ou au plâtre. A partir de ces débuts, la présentation retrace l'évolution de la philosophie et de la pratique de la conservation des mosaïques, pour arriver aux « méthodes de pointe » actuelles.*

In a sense the conservation of mosaics is a practice as old as the making of mosaics themselves. Today one can find ancient mosaics with patches made as part of maintenance when the floors were still in use. In more recent centuries restoration was widely practiced on objects of antiquity, including mosaics. And from the first decades of the twentieth century we have fine examples of restorations.

Before the mid-twentieth century, discoveries of mosaics occurred primarily during archaeological excavation of

known sites. During the postwar period in Europe massive construction and reconstruction was undertaken, and discoveries of mosaics occurred more frequently throughout the continent. This does not mean, however, that these artifacts were ultimately preserved. According to a 1971 study by the French engineer Claude Bassier, of 660 pavements found in France since 1870 and published by archaeologists, at least 83 percent were abandoned, destroyed, or lost (Bassier 1975). The remaining pavements—those whose subjects were figurative and considered valuable—were, according to the traditional techniques of the time, systematically removed from archaeological sites. Some were relaid on concrete slabs; others were abandoned in storage, where many remain today (fig. 1).



FIGURE 1 Mosaics lifted from their original sites and placed in storage. Photo by Roberto Nardi.

In the early postwar period strategies for mosaic conservation were very limited; detachment was the primary option available. Interventions were typically undertaken without adequate planning and with a workforce that consisted mainly of artisans, craftspersons, or carpenters. Conservation practice was based solely on empirical knowledge, and the materials used by practitioners were limited to cement, gypsum, and adhesives. In addition, documentation was lacking. Practitioners worked in isolation, without the benefit of professional associations. An exception in the late 1950s to the typical treatment of excavated mosaics was the completion of the excavation of the Villa del Casale in Piazza Armerina, Sicily (fig. 2); there Cesare Brandi introduced the solution of conserving the villa's remarkable mosaics in situ and protecting the entire site (Brandi 1956; Stanley-Price 1997).



FIGURE 2 The mosaics of the Villa Romana del Casale in Piazza Armerina, Sicily, were conserved in situ and sheltered in the late 1950s. Photo by Guillermo Aldana 1993. © J. Paul Getty Trust.

In the 1960s a dramatic evolution in mosaic conservation began. Two important professional figures came to prominence in this decade: Rolf Wihr in Cologne, Germany, and Claude Bassier in Périgueux, France. Wihr was a conservator-restorer, working at the Rheinisches Landesmuseum in Trier. Bassier, in private practice, was called in on rescue excavations when mosaics were discovered. He was able to arrive within two days, with trucks, a crate, and a tent with heating systems, ready to work, even in winter. Both Wihr and Bassier introduced new approaches, which included systematic documentation, new supports (honeycomb aluminum instead of concrete), and new adhesives (resins instead of glues and cement) (Bassier 1978). But they also continued the established practice of polishing the mosaic surfaces.

A third significant figure who advanced the field technologically at an early date was Antonio Cassio of the Istituto Centrale per il Restauro in Rome. Cassio, a mosaicist from a family of mosaicists, preferred a more sensitive and controlled method for detaching mosaics. He used a system typical of mosaic making itself, which permitted the detachment of mosaics in pieces averaging 25 square centimeters (Cassio 1982). This method substantially reduced cutting stresses—and therefore reduced damage to mosaics being lifted.

In the late 1960s, again in Italy, a different field—mural painting—was undergoing a theoretical and practical reevaluation, which would have a direct and important impact on mosaic conservation. In 1968 the International Center for the Study of the Preservation and Restoration of Cultural Property (ICCROM) joined with the Istituto Centrale per il Restauro to initiate an annual four-month course on the conservation of wall paintings. At first the highlight of the course was the detachment of a wall painting, but very quickly in situ consolidation was embraced as a more appropriate method, as wall paintings came to be considered an integral part of the buildings in which they occurred. This evolution in wall paintings conservation led to the publication in 1977 of the fundamental book for the profession, *Conservation of Wall Paintings* (Mora, Mora, and Philippot 1977).

Establishing the International Committee for the Conservation of Mosaics

All this was in the air in 1977 when the first meeting on mosaic conservation—with forty-five participants—was organized in Rome. At the end of this conference ten of the participants decided to establish the International Committee for the Conservation of Mosaics (ICCM) and to act as its first board.

The publication of the proceedings of the meeting, addressed to archaeologists, conservator-restorers, technicians, administrators, and the public, was titled *Mosaics, No. 1: Deterioration and Conservation* (Selvig 1978). Another important result of the meeting was the recommendation to launch a course on mosaic conservation.

The 1977 meeting in Rome was the starting point for a series of regular conferences. The following year, the Institut National du Patrimoine in Tunisia hosted the second conference and went on to host subsequent meetings of the ICCM board. The latest conference, the ninth, took place in Hammamet, Tunisia, in 2005. Following each of these meetings, the proceedings were published. In addition to the proceedings, twelve newsletters have been published. These materials represent for the profession a basic source of information that did not exist fifty years ago.

The evolution in the thinking of the ICCM—and, indirectly, the trend in its professional principles—is reflected in the themes of each of its conferences:

- Rome, Italy, 1977: *Deterioration and Conservation*
- Tunis and Carthage, Tunisia, 1978: *Safeguard*
- Aquileia, Italy, 1983: *Conservation in Situ*
- Soria, Spain, 1986: *Conservation in Situ*
- Palencia, Spain, 1989: *Conservation in Situ*
- Faro-Conimbriga, Portugal, 1992: *Conservation, Protection, Presentation*
- Nicosia, Cyprus, 1996: *Mosaics Make a Site: The Conservation in Situ of Mosaics on Archaeological Sites*
- Saint-Romain-en-Gal and Arles, France, 1999: *Mosaics: Conserve to Display?*
- Thessaloniki, Greece, 2002: *Wall and Floor Mosaics: Conservation, Maintenance, and Presentation*
- Hammamet, Tunisia, 2005: *Lessons Learned: Reflecting on the Theory and Practice of Mosaic Conservation*

It is evident that by 1983 the ICCM was pointing out the importance of in situ conservation and encouraging its use whenever possible. In this way, it mirrored an evolution that had already occurred among wall paintings specialists.

Another principle that ICCM has come to strongly support is the rejection of the use of cement in the conservation and restoration of mosaics. It had been clear for some time that the use of cement in the conservation of ancient monuments brought the risk of an increase in damage. In response, the Italian conservation scientist Giorgio Torraca launched research in 1980 to replace cement with, paradoxically, one of

the oldest construction materials known—lime-based mortar (Ferragni et al. 1984). However, even within the ICCM, almost ten years of heated debate took place before lime-based mortars were generally accepted and before cement applied in direct contact with mosaics was replaced. The use of lime-based mortars has allowed the development of in situ consolidation and furthered the practice of maintenance in situ when possible. (Unfortunately, despite the abundant evidence of destruction caused by cement in conservation interventions, this material is still used on mosaics—and worse, its use is still taught as a technique in some countries.)

Another important advance that can be credited to discussion and reflection at several ICCM conferences was the acceptance by conservation practitioners of a planned approach to safeguarding mosaic floors. In 1996 a question-driven flowchart was developed to help practitioners determine which of several options would be most appropriate to a particular context and set of problems (fig. 3). The questions related to risk, visitation, significance, available resources, and archaeological investigation, and they led to consideration of a range of options, including backfilling, lifting and transferring to a museum, lifting and re-laying in situ, and consolidation in situ.

The standard practice of leaving a mosaic on-site without protection—or of lifting the pavement and abandoning it in storage—was clearly the result of a lack of planning, as well as demonstrative of the attitude of some archaeologists, insensitive to conservation, who felt that their work ended the day they published their findings. A systematic analysis of practical conditions can help to determine different and more appropriate approaches for dealing with an excavated mosaic. With any of these options, serious planning before implementation is required.

The four ICCM conferences following those dedicated to in situ conservation referenced in their titles the issues of public presentation of mosaics. As early as 1978 it was suggested in *Mosaics, No. 1*, that the public be involved “so that specialists responsible for conservation receive support from both groups and individuals. It is the public, after all, that benefits and is served by the world-wide conservation movement” (Selvig 1978: foreword). This approach established in the mosaic conservation field recognition that an objective of the conservation profession is to present and to interpret for the public the cultural properties that we are engaged in conserving (fig. 4).

To influence the actual practice of mosaic conservation, these new ideas and approaches required adequate training at all levels. Yet the development of training did not happen

FIGURE 3 Question-driven flowchart developed in 1996 to guide decision making.

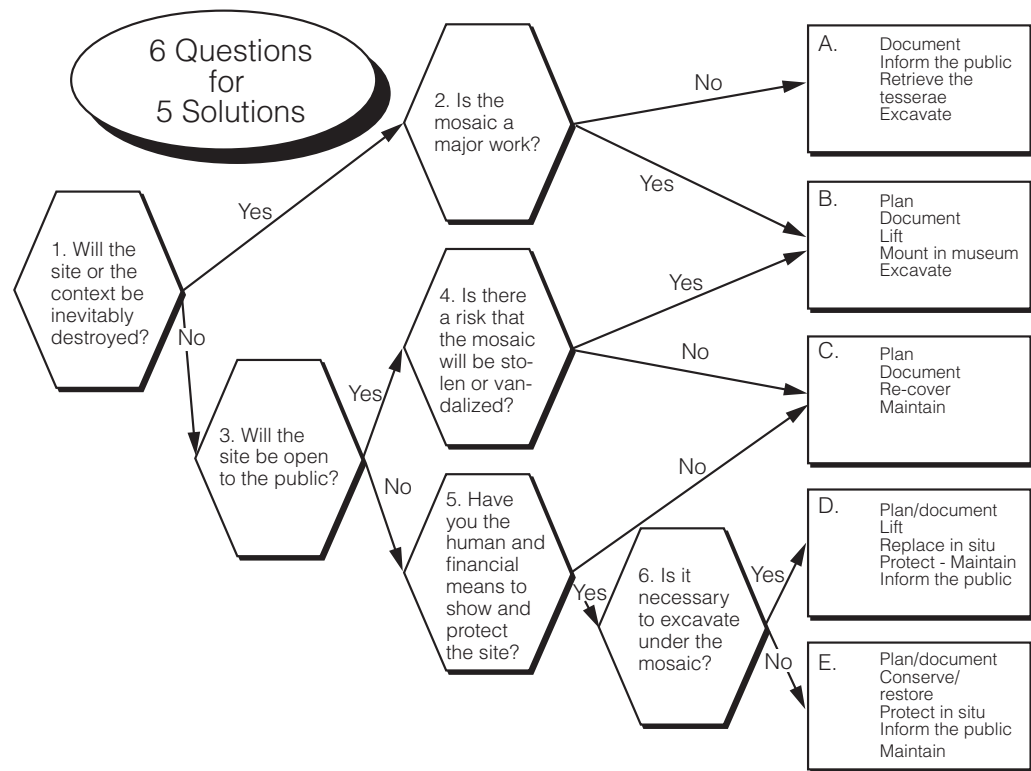


FIGURE 4 Visitors watching conservation activities at the site of Zippori, Israel. Photo by Roberto Nardi.

quickly. Twelve years passed after the 1977 recommendation for training before the first course for decision makers was initiated. The one-month course—organized by ICCROM in 1989 in Rome—was attended primarily by archaeologists (Melucco Vaccaro, de Guichen, and Nardi 1994). Today some of the participants of that early course are members of the ICCM board.

Since that time several courses at various levels have been—and continue to be—organized. While this activity is generally welcome, certain doubts exist regarding their efficacy. Some of the sessions are considered too short—a few weeks at most—or it is felt that the trainers lack the necessary teaching ability. In some instances the production of new mosaics is taught simultaneously with conservation techniques—a questionable pairing.

An example of training appropriately adapted to the challenge faced is the technician training program launched by the GCI and Tunisia's Institut National du Patrimoine in 1998 (fig. 5). This long-term involvement in training technicians in the care and maintenance of in situ archaeological mosaics is attempting to enhance the ability of cultural authorities in Tunisia to preserve the country's wealth of mosaic heritage.

FIGURE 5 Technicians-in-training stabilizing a mosaic pavement at the site of Thuburbo Majus, Tunisia. Photo by Kristin Kelly 2003. © J. Paul Getty Trust.



Maturing of the Profession

For the mosaic conservation field, the past fifty years constitute a period of great change and maturation. The establishment and development of the ICCM has advanced the work begun by the Association Internationale pour l'Étude de la Mosaique Antique (AIEMA) and later developed by the Association for the Study and Preservation of Roman Mosaics (ASPROM) in Great Britain and the Associazione Italiana per lo Studio e la Conservazione del Mosaico (AISCOM) in Italy.

Unlike three decades ago, the scope of mosaic conservation is no longer restricted to a few square meters of tesserae recently excavated or on exhibit in a museum. It has expanded to include entire mosaic complexes or sites where thousands of square meters of mosaics are in danger. And the conservator has been joined by other professionals in the field of conservation in addressing the problems of mosaic conservation. Among them are conservation scientists who share an interest in finding solutions to mosaic conservation globally—and not simply through the lens of a microscope. That 250 colleagues from thirty countries—and with many different backgrounds—attended the 9th ICCM Conference indicates that common problems exist and that the interest in solving them collectively is very high.

At the same time it is evident that there are issues that have not been resolved, and a great deal of work remains to be done. There is an urgent need to properly conserve and store hundreds, if not thousands, of mosaics previously relaid on reinforced concrete or abandoned in storage. Reburial of mosaics is an important tool for preserving mosaics, but it requires clear protocols and a technical and financial assessment. Further research on the protection of mosaics from biological growth would contribute to resolving a widespread problem confronting the preservation and presentation of mosaics. Studies of the cost of maintenance of mosaics in situ are needed to help promote this approach. Assessments of training needs for archaeologists, conservator-restorers, and technicians are essential to ensuring long-term protection of mosaics. And finally, the publication of a major book on the conservation and restoration of mosaics is long overdue.

These are only some of the challenges faced by the professionals charged with responsibility for conserving and exhibiting mosaics. There is still a long way to go. Nevertheless, it is not unrealistic to look to the future with optimism. With the help of the ICCM, the great vitality demonstrated by the profession has resulted in standards of mosaic conservation practice today that appeared almost unreachable thirty years ago. Much has been accomplished, and those accomplishments form an essential foundation for the work that lies ahead.

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Learning from Past Interventions: Evaluation of the Project to Conserve the Orpheus Mosaic at Paphos, Cyprus

Martha Demas, Thomas Roby, Neville Agnew, Giorgio Capriotti, Niki Savvides, and Demetrios Michaelides

Abstract: *In 1988–89 a project to lift and re-lay the Orpheus mosaic at Paphos, Cyprus, was undertaken by the Getty Conservation Institute and the Department of Antiquities, Cyprus. The project was evaluated in 2004 to determine whether it had met its intended goals and contributed to the field of mosaic conservation. This paper presents the methodology for evaluation of the project as a whole, poses the main issues and questions raised during the in situ assessment, and provides an overview of results and the three main lessons learned, which relate to the importance of values in decision making, the critical role of documentation, and the need for effective management for sustainability.*

Résumé: *En 1988–89 la dépose et la repose de la mosaïque d’Orphée à Paphos, Chypre, a été effectuée par l’Institut Getty de Conservation et le Département des Antiquités de Chypre. En 2004, ce projet a fait l’objet d’une évaluation pour déterminer dans quelle mesure il avait atteint ses objectifs et contribué au domaine de la conservation des mosaïques. Cette communication présente la méthodologie d’évaluation, évoque les problématiques survenues lors de l’évaluation in situ et résume les résultats ainsi que les trois principaux enseignements, à savoir l’importance des valeurs dans la prise de décisions, le rôle essentiel de la documentation et la nécessité d’une gestion efficace pour assurer la durabilité.*

In 1988–89 an exceptional figural mosaic of Orpheus and the Beasts, dated to the late second/early third century C.E., was lifted and relaid in situ on a new support in Paphos, Cyprus. The technique and materials used—rolling of the mosaic and re-laying on a lightweight honeycomb aluminum support

(Aerolam® panels)—had been employed in the detachment of mosaics, but on a smaller scale and mainly for preservation in a museum context.¹ The relaid mosaic was further protected with what was intended to be a temporary shelter, pending construction of permanent shelters by the Department of Antiquities over all the mosaics at the Paphos site.

The project to lift and re-lay the mosaic was a joint undertaking by the Getty Conservation Institute (GCI) and the Department of Antiquities, Cyprus, and constitutes one of the GCI’s earliest field projects. As part of a larger initiative of the GCI to assess some of its previous projects, it was decided in 2003 to evaluate the Orpheus project. The purpose of evaluation is to determine whether the project has met its intended goals and contributed to the advancement of the theory and practice of conservation (and if not, why not?). Evaluation may be thought of as an interface between the past and the future, since it involves a systematic investigation of a past activity in order to inform and improve future activities. The goal, then, is to learn lessons, both the lessons of success and those of failure.

This paper presents the basic methodology developed for evaluation of the project as a whole, poses the main issues and questions raised during the in situ assessment, and provides an overview of the results obtained and the three main lessons learned from the assessment.

The Project to Lift and Re-lay the Orpheus Mosaic

The Orpheus mosaic (4.25 by 5.10 m) was excavated in 1984 by one of the authors under the auspices of the Department

of Antiquities, Cyprus.² It suffered from root intrusion that resulted in a few large lacunae and dislocation and loss of tesserae along the top part of the mosaic, destruction of its edges from ancient robbing of the walls of the room, subsidence caused by the presence of earlier structures below the mosaic, which became more pronounced as the subsoil dried out following excavation, and lack of cohesion of the mortar of the bedding layer (fig. 1) (Michaelides 1991).

For these reasons, particularly lack of cohesion and subsidence of the bedding layers, and in line with common practice of the Cypriot Department of Antiquities, the Orpheus mosaic was to be conserved through lifting and re-laying. The technique of rolling the *tessellatum* on a large wooden cylinder (or drum) was selected because the mosaic was largely intact, without structural cracking, was accessible to large machinery, and, most important, could be lifted as a single intact, pictorial composition. The project began in 1988, under the general direction of Paolo Mora, as consultant to the GCI, and entailed three main components: lifting and re-laying of the mosaic, training of conservators in the technique, and temporary sheltering of the mosaic (see Stanley-Price 1991 for details of the project implementation, participants, and costs).

Lifting of the mosaic using the rolling technique and re-laying it on an isolating support of Aerolam® panels with epoxy

adhesive and fiberglass sheets constituted the core of the project. Other aspects included analysis of tesserae and mortars and a yearlong environmental monitoring of the site. Lifting and re-laying took place over two years, 1988–89, but since the details of the technique are not the subject of this evaluation, we will compress the complexity and technicalities of the undertaking into a very brief review of the steps involved:

- documentation and preparation (facing and consolidation) of the mosaic;
- detachment of the *tessellatum* from the bedding layers and rolling it on a wooden cylinder as it was detached;
- cleaning of mortar from the back of the *tessellatum* while on the cylinder (and again after it was laid facedown) (fig. 2);
- transport of the rolled mosaic by bulldozer to its temporary storage, where it was unrolled facedown;
- application of new mortar to the back of the *tessellatum*, followed by epoxy adhesive and fiberglass sheets;
- construction of the new support, consisting of an Aerolam® panel (with aluminum honeycomb core), adhered to the prepared mosaic with epoxy;
- preparation of the original site with a concrete slab;

FIGURE 1 Orpheus mosaic (foreground) prior to being lifted in 1988, with the Amazon and Heracles mosaic (background) already partially lifted and relaid. Photo by Guillermo Aldana 1998.
© J. Paul Getty Trust.



- reinstallation of the mosaic with panel in its original location using a crane to lift it in place; and, finally,
- removal of the facing and filling of lacunae with mortar.



FIGURE 2 Mortar being removed from the back of the Orpheus mosaic while it is rolled on the drum. Photo by Paolo Pastorello 1998. © J. Paul Getty Trust.

Figure 3 shows the mosaic on its Aerolam® panel after it was relaid in its original position.

The project was designed with a didactic component. It would provide conservators with hands-on experience in the rolling technique, which was infrequently used at the time but was believed to have potential for greater use as a method for lifting and re-laying figural mosaics to avoid the potentially destructive aspects of cutting a mosaic in sections. Nine conservators from the Mediterranean region took part in the project. During Phase 1, training was divided between formal classroom lectures on other aspects of and approaches to mosaic conservation and on-site work on the Orpheus and other mosaics at Paphos. Phase 2 training was exclusively hands-on work, aimed at implementation of the project.

The construction of a shelter to protect the Orpheus mosaic was a later addition to the original project objectives (fig. 4). It arose out of a GCI initiative to develop a lightweight, modular, and temporary shelter for protection of archaeological sites. The so-called hexashelter began as an experimental design by Neville Agnew that was field-tested and evaluated in 1988 at Fort Selden, New Mexico (Agnew and Coffman 1991; Agnew et al. 1996). In 1989 it was decided to apply the prototype to protect the Orpheus mosaic temporarily (no more than five years) pending permanent sheltering and site

FIGURE 3 Orpheus mosaic on the Aerolam® panel relaid in its original position but before final cleaning, filling of lacunae, and rebuilding of the surrounding walls of the room. Photo by Guillermo Aldana 1989. © J. Paul Getty Trust.





(a)

FIGURE 4A, B The “hexashelter,” a modular system designed as temporary protection for the Orpheus mosaic, as seen from the exterior (a) and interior (b). Photos by Martha Demas 1992.
© J. Paul Getty Trust.



(b)

development for Paphos, which was at that time under discussion as part of a World Bank loan.³

The Orpheus Mosaic Project was completed in 1989 and published soon after (Stanley-Price 1991). The decision to evaluate the project was prompted in part by an experts’ meeting on mosaic conservation held in Cyprus in 2002, at which

evaluation of previous projects was raised as an important need in the field. Because the Orpheus project was the second field project of the GCI (founded in 1985) and the GCI was again involved with mosaics, it was decided that an evaluation of the Orpheus project would serve both institutional needs and those of the field of mosaic conservation.

Methodology for Evaluation

The methodology used for evaluation of the project consists of two parts. The first is simply collection of background information and documentation, and needs no elaboration or explanation, except to note that gathering such information can be time-consuming and frustrating if the documentation has not been archived in an orderly and accessible manner.

The second part, the analytic component, is the crucial one. Cultural heritage conservation has not developed models for project evaluation, but nature conservation offers plenty, as do the educational and corporate worlds. The models from nature conservation were generally more compatible with the aims and ways of working in cultural heritage conservation, and we thus adapted the methodology of the World Conservation Union,⁴ formerly the International Union for Conservation of Nature and Natural Resources.

The methodology is based on what are defined as “key questions of evaluation.” These are broad and generic, but they bring to the fore the most salient aspects of project evaluation: relevance, effectiveness, impact, and sustainability. In our evaluation the key questions were answered by considering the following:

- the history of the project and all supporting documentation;
- a new condition survey of the Orpheus mosaic and shelter;
- comparison with the condition of the adjacent Amazon and Heracles mosaic;
- a review of the literature on lifting and citation searches of the Orpheus publication;
- professional input from colleagues involved in the original project;
- an analysis of the values of the Orpheus mosaic; and
- informal on-site assessment of the mosaic and shelter over the years since implementation of the project.

The remainder of this paper focuses on a selection of the issues that emerged from the evaluation and were judged to be of most interest to and with broad implications for the mosaic conservation field. The review is structured according to the key evaluation questions.

Relevance: Was the Project a Good Idea Given the Situation Needing Improvement?

How was the “situation needing improvement” defined eighteen years ago? The issue was never made explicit in those

terms, but there were several assumptions and entrenched practices that were implicit in determining the goals of the project. These were as follows:

- The artistic value of a mosaic is paramount or at least takes precedence over historic and scientific values.
- Mosaics cannot be left in situ without risking their destruction (hence the common practice of lifting and re-laying).
- Lifting of mosaics in sections, though standard operating procedure at the time, could not be accomplished because the Orpheus mosaic—a single pictorial composition—could not be easily subdivided into smaller panels to enable lifting. Further, were it to be lifted in that manner, the result would be substantial loss of tesserae and difficulties in aesthetic reintegration.
- Archaeological excavation below the mosaic, to investigate earlier use of the site, was highly desirable (from the archaeologist’s perspective) and was common practice at the time.

In light of these assumptions and ways of operating, the situation needing improvement might be formulated in retrospect as a method to lift and re-lay the mosaic in a manner that would cause least damage, ensure aesthetic integrity, and allow excavation below it. Given that limited situation to improve, we can conclude that the project had relevance and was a reasonably good idea. But was this really the situation that needed improving?

While acknowledging that methods of lifting and re-laying are still a challenge, we now recognize far more significant challenges in conserving mosaics. In 1987, when the decision on the project was made, the field of mosaic conservation was on the cusp of moving toward a much broader concept of conservation and the values attributed to archaeological sites. It is not without some irony that the year after the Orpheus project was completed, the GCI organized the first of its two international courses on conservation and management of archaeological sites in Paphos, which encapsulated this larger vision.

Certainly today we would define the “situation needing improvement”—at Paphos and indeed at most archaeological sites—very differently:

- regular maintenance of sites;
- conservation and management planning for archaeological sites;

- a management structure responsive to the needs of conservation;
- a better understanding of causes of deterioration to mosaics left in situ in relation to treatment options;
- trained and dedicated personnel to conserve, manage, and monitor sites; and
- the continuing excavation of archaeological sites in the absence of all the above.

Thus we would have to acknowledge that the aims of the project were soon made obsolete and are today not highly relevant given changed circumstances and approaches to conservation.

Effectiveness: Have the Planned Results Been Achieved? Were the Methods Used Effective?

Effectiveness can be measured in many ways, and we propose two ways for the Orpheus intervention: the effectiveness of the technique in preserving the materiality and the values of the mosaic.

As an intervention, the rolling and re-laying procedure was complex, technically and logistically challenging, and risky. It was carried out with professionalism and skill, and it was largely successful inasmuch as it demonstrated that the *tessellatum* could be lifted and relaid in its entirety, with relatively little loss or damage. This is not to suggest that there were no problems and difficulties,⁵ but it is to recognize that the rolling proved an effective technique for lifting a mosaic in one piece.

But how effective was the intervention in preserving the material object (i.e., the relaid *tessellatum*) over time? To answer this question, an assessment of the physical condition of the mosaic was undertaken in 2004 by the authors of this paper.⁶ The assessment was also an opportunity to determine whether documentation carried out during the project was adequate to permit a meaningful evaluation of the interventions to the mosaic fifteen years later. In addition to rephotographing and recording the condition graphically,⁷ we used the rapid assessment form developed for the initiative to assess the performance of shelters over mosaics (see Stewart, this volume).

In summary, the survey revealed that after fifteen years the Orpheus mosaic was in good condition. The most significant deterioration that could be attributed to the years after the re-laying in 1989 were as follows:

- loss of tesserae: approximately seventy-five tesserae had been lost since 1989, most from border areas

(mainly those embedded in polyester resin after re-laying in 1989) (fig. 5), as well as a few loose or detached tesserae;

- continued erosion and exfoliation of the glass tesserae;
- detachment and extensive loss of the infill mortar in the large lacuna and around the edges of the mosaic; and
- detachment of the new bedding: detachment occurred between the epoxy layer and the panel (not where one might expect it, between the mortar and epoxy layers) and was documented over approximately one-fifth of the area of the mosaic but was particularly noticeable in the southeast corner.⁸

With the exception of the loss of tesserae, these are correctable problems. Certainly the overall good state of preser-



FIGURE 5 Loss of tesserae that had been embedded in polyester resin soon after the re-laying; loss of infill mortar is visible on the right. Photo by Vassos Stylianou 2004. © J. Paul Getty Trust.

vation of the mosaic can be attributed to its isolation from the ground, but it is also important to remember that the mosaic had been sheltered for the entire period of its relaid life. It is difficult to assess the effectiveness of the re-laying on Aerolam® panels as distinct from the protective function of the shelter.⁹ What is clear, however, is that the majority of post-1989 conditions can be attributed to lack of maintenance and monitoring of the mosaic and the shelter, whose materials were allowed to degrade to a point where it was no longer serving a protective function (fig. 6). It should also be noted that despite a simple barrier, there was no supervision of visitors, allowing direct access to the mosaic. All these conditions could have been reversed or corrected had routine monitoring and maintenance been undertaken.

The Amazon and Heracles mosaic is located in the room adjacent to that of the Orpheus mosaic (see fig. 1). It has had a complicated life, with several episodes of excavation and reburial (beginning in 1942) and partial lifting and re-laying in 1984. Since 1990 the mosaic had been protected, in a fashion typical at the site, by a shallow covering consisting of green netting and a layer of sand (4–5 cm) and expanded clay pellets; the covering became shallower as the years passed. The assessment of the Orpheus mosaic entailed a comparison of its condition with that of the Amazon and Heracles mosaic; and the latter was uncovered and inspected for this purpose. However, due to uncertainty regarding its treatment history and the

techniques and materials used (there was no documentation available), and the many variables, it was not possible to make a meaningful comparison. It is of interest to note, however, that many of the tesserae (red, blue-gray, and white limestone) were actively flaking, which was exacerbated by the infiltration of rootlets from vegetation that grew in the shallow covering (as micro-cracks developed in the tesserae, the rootlets penetrated these). We believe this is the result of the very shallow covering leading to wetting/drying cycles and perhaps salt crystallization.¹⁰

A more challenging, less quantifiable measure of effectiveness is the success of the intervention in preserving the values of the Orpheus mosaic. As noted earlier, aesthetic considerations were uppermost in the decision to use the rolling technique to lift this figural mosaic. All methods of lifting a mosaic privilege certain artistic and historic values that reside in the *tessellatum*—such as artistic composition, iconography, and attribution to mosaic schools, makers, and patrons. Such information and appreciation, which is found in the surface of a mosaic (fig. 7), can, however, also be gleaned from mosaics removed to a museum. The decision to re-lay the mosaic in its original location (rather than a museum) was a recognition that mosaics do indeed “make a site” and contribute significantly to the architectural ensemble of which they are a part.

These are all critically important values to preserve, but other aspects of the mosaic’s significance have been lost through

FIGURE 6 The covering materials of the hexashelter had severely degraded by 2004, fifteen years after the shelter was erected. Photo by Martha Demas 2004. © J. Paul Getty Trust.





FIGURE 7 The Orpheus mosaic after re-laying on its new support in 1989 (before infilling lacunae) retains aspects of artistic and historic value—artistic composition, iconography, and attribution—that are most prized in mosaics. Photo by Guillermo Aldana 1989. © J. Paul Getty Trust.

the lifting and re-laying process. The historic and scientific information that resided in the stratigraphy of the bedding layers, including evidence of the preparatory design drawing and layout, was destroyed by this procedure. The stratigraphy was photographed and drawn, but other evidence was only noted and not otherwise documented. Whether such basic recording is sufficient compensation for the loss of information is debatable. Another aspect of historic value is the object as an authentic testament to its physical history—its patina of age. As has been observed, however, one person's patina is another's damage (Muñoz Viñas 2005: 104), and this is well illustrated in the differing opinions about the rigidity and extreme flatness of the relaid Orpheus mosaic—its appearance of having been ironed: some would argue that it helps reinstate the artistic significance; others, that it detracts from both its aesthetic and historic values, especially in its ruined architectural context. Ultimately, this is a question of values—and a conflict of values—that needs

to be better articulated, defended, and justified in every intervention we make to a mosaic.

Impact: To What Extent Has the Project Contributed (Intentionally or Unintentionally) to Longer-Term Goals and Benefits to the Field?

Impact is an especially important parameter in the field of conservation, where financial resources are limited. The Orpheus project was intended to have a larger impact on the field. Paolo Mora's message in the foreword to the 1991 publication expresses the intention:

While the rolling technique used for lifting the Orpheus mosaic will not be applicable to all mosaics, and the cost or unavailability of specialized materials might be prohibitive in some cases, we consider it very important that conservators be made aware of this method. Increased familiarity with the technique will not only allow conservators to make more educated decisions in mosaics preservation, it may also serve as the basis for future developments and improvements in the technique. (Stanley-Price 1991: vi)

Despite the training component and the timely publication of the project, this intention of achieving wider impact was not realized. A literature and citation search,¹¹ and an assessment of unpublished practice to the extent that we know it, has not revealed any discernible influence on conservation thinking; on the use, development, or improvement of the rolling technique; or on the lifting and re-laying of mosaics generally.

This, we believe, can be attributed to two factors. One is the technical and logistical difficulties and cost implications of this technique. The second, more important factor is the changing approach to mosaic conservation (the trend toward conservation in situ and a broader understanding of what conservation entails), which was beginning to be felt just about the time the project was undertaken.

Nor did the project have any impact on the authorities responsible for the site; indeed, an unintended consequence of the project may have been to encourage the notion that because the mosaic was relaid on an isolating support, it required little or no maintenance. Certainly little was done over the fifteen years to maintain or monitor the mosaic, its setting, and its shelter (fig. 6).

And finally, there was no impact on the visiting public. This is because the project had not been integrated into a

larger vision for the site. The result was a lost opportunity to interpret the conservation intervention to the public. We have all experienced the fascination of the public with conservation activities; if visitors can be engaged watching people clean a mosaic, how much more engaged might they be by the rather dramatic story of the rolling and re-laying of the mosaic, and what more impressive didactic tool than the large wooden cylinder that lay just outside the shelter for thirteen years until it was removed in the initial stage of landscaping the site?

Sustainability: Was the Project Design Adequate to Ensure a Sustainable Result?

Technical conservation solutions that do not take into account the larger context in which they are being undertaken are ultimately not sustainable. For cultural heritage conservation, *context* means the cultural context that contributes to significance; the management context in which the object is cared for and interpreted; and the physical and environmental context in which the object exists. The only reasons to preserve a mosaic in its original location (rather than place it in a museum) are to present it in a cultural context and, increasingly, to attract visitors, but in the absence of a management context that would ensure maintenance, protection, and interpretation, that purpose is compromised, if not defeated. The Orpheus project provided conservators with a technical solution for an object seen in isolation, but over the years the architectural setting

of the mosaic and its protective shelter deteriorated due to the absence of effective management. One might argue that in the face of ineffective management and maintenance, the lifting and re-laying proved a more sustainable result than conserving the mosaic in situ, since it “hardened” the mosaic against the vicissitudes of humans and nature. That may well be true, and there may be situations that require such an approach, but for a site of World Heritage stature, such as Paphos, sustainability should be the result of good management rather than of fortifying a site against lack of management.

Another important aspect of sustainability pertinent to conservation projects is documentation. Baseline documentation is fundamental to assessing change in the future and determining whether deterioration is ongoing. Documentation of the Orpheus mosaic was undertaken in 1988, 1989, and 2004 (fig. 8), but over the years condition terminology changed, technology evolved, grids shifted, and cameras and lighting differed, making it difficult to replicate and be consistent. Nevertheless, baseline documentation of the Orpheus mosaic was actually quite good, and the close-up photography was especially useful for assessing change in surface conditions. But even the best documentation is useless if it is not properly archived, accessible, and used. Most project materials were archived, some were lost, not all the necessary documentation was provided to the partner institution, and what was provided could not always be found.

FIGURE 8 Graphic recording of the condition of the Orpheus mosaic in 2004, used for comparison with documentation undertaken in 1988 before re-laying and in 1989 after re-laying. Photo by Neville Agnew 2004. © J. Paul Getty Trust.



Although photodocumentation was well archived and cared for, it was never subsequently used or consulted, precisely because it was archival. A duplicate set of photographs was never prepared in a form to be used (and accessed) by site personnel for future monitoring.

Conclusion

The answers to the evaluation questions do not tell us whether the project aims were right or wrong, a success or a failure. That is not the objective of evaluation. What is important are the messages from the past that should inform our present and future actions. The results of the evaluation converge toward three key messages.

The first pertains to values and decision making. Values should be central to deciding whether to move a mosaic to a museum (for exhibition or storage), lift and re-lay it in situ, or conserve it in situ. Assessing values is not a purely subjective undertaking, although it sometimes seems so; consensus among stakeholders matters, and it is the reason the field of mosaic conservation has moved toward in situ preservation. Nevertheless, whatever the conservation intervention, we need to be more effective at assessing and communicating those values we are trying to preserve and what the implications of our intervention decisions are for significance. While the primary response should be to seek solutions that preserve as many of the mosaic's values as possible, the secondary response, when we destroy aspects of significance, must be to compensate as fully as possible for that loss, especially if the intervention, like the Orpheus one, is irreversible.

The second message concerns the importance of accurate, precise, and repeatable documentation that is archived and accessible. Accessibility is a function of how widely the documentation is published and disseminated and the medium in which it is recorded, especially for digital recording. However, even if archived and accessible, documentation will not be routinely used for monitoring unless it is specifically tailored for that purpose. This requires monitoring protocols that define the indicators of change, such as photographs of specific conditions to be monitored over time, which are placed in the hands of those charged with using them.

Undoubtedly the most important lesson to be learned is that conservation interventions require effective management (assessment and planning, trained personnel, a maintenance regime, good leadership) if they are to be sustainable. Effective management demands holistic approaches but does not seek final solutions; there is never a final solution for cul-

tural sites. Orpheus and its shelter (and the adjacent Amazon and Heracles mosaic, with its few centimeters of protective sand) hung on valiantly for fifteen years waiting for such a solution¹²—permanent shelters and landscaping—and during this period, our values changed, the site deteriorated, documents were lost, personnel moved on, thousands of visitors came and went without being informed and educated, and innumerable opportunities were lost for incremental change for the better. Surely, these are situations we can improve by taking them into account whenever we embark on a new project and must decide how to conserve and how best to use the limited resources that are available to conservation.

Notes

- 1 Aerolam® panels are more commonly used for exhibiting detached mosaics in a museum, and rolling is generally done with smaller cylinders; for a recent review of the history of lifting and current trends, see Podany 2006: 115–28.
- 2 Demetrios Michaelides, archaeological officer in Paphos at the time. See Michaelides 1986 for discovery and excavation of the Orpheus mosaic.
- 3 For a journalistic overview of the need for a master plan at Paphos and the origins of the World Bank project, see Wigg 1994: 1–24. For a more recent description of the plan, from the perspective of the Cypriot authorities, see Hadjisavvas 2003.
- 4 For the IUCN methodology, part of its Global Monitoring and Evaluation Initiative, see Woodhill 2000. The methodology was selected based on research carried out by David Myers (project specialist, GCI).
- 5 For example, shallow linear indentations in the *tessellatum*, seen only in raking light, are attributed to creasing of the plastic sheeting on which the *tessellatum* was unrolled, and there were small areas of tesserae loss, most noticeably around the neck of the partridge. These conditions were recorded by conservator J. Claire Dean in a post-re-laying assessment.
- 6 The condition assessment was carried out September 4–11, 2004, with the permission of the Department of Antiquities, Cyprus. In addition to the authors of this paper, participants in the fieldwork were conservator Andreas Georgiades and technician George Tapakoudes (Department of Antiquities) and Maria Ktori and Evi Charalambous, students from the Department of History and Archaeology, University of Cyprus. The report on the field assessment with recommendations was sent to the Department of Antiquities.
- 7 The condition photography was undertaken by Vassos Stylianou using a Hasselblad camera fitted with a digital back and followed the grid established for the 1989 photography. Giorgio Capriotti, who had undertaken the original condition recording and

- participated in the project in 1988–89, undertook the 2004 recording with Thomas Roby.
- 8 We cannot be certain, however, that the detachment occurred in the fifteen years after re-laying. It may have been present in an incipient state upon re-laying in 1989.
 - 9 See Agnew et al. 1996 for the effectiveness of the hexashelter prototype in modifying the environment under the shelter.
 - 10 The Amazon and Heracles mosaic was reburied by the Department of Antiquities after the 2004 assessment under a deep (50 cm) covering of soil.
 - 11 A literature search was undertaken through 2004 using the major conservation databases (e.g., AATA, ArtIndex, BCIN, ICCROM library catalogue); citation searches were done in the Arts and Humanities database and through the Web. Dissemination of the Orpheus publication was searched through Worldcat, which searches some 53,000 libraries in 96 countries, although the majority are in the United States; only 135 libraries contained the Orpheus mosaic. The authors are grateful to Valerie Greathouse (reference librarian, GCI) for undertaking the searches and Sibylla Tringham (GCI graduate intern in 2004) for compiling the information.
 - 12 The lightweight materials of the shelter (an impermeable membrane and a permeable woven fabric) held up far beyond their intended life but were severely degraded by the time of the assessment in September 2004. The Department of Antiquities attempted to repair the membrane in late 2004, but unsuccessfully, as during winter storms in 2005 rainwater was observed falling on the mosaic and pooling. The membrane developed a large tear, necessitating its removal in February 2006. The Orpheus mosaic has since been reburied, pending construction of the permanent shelters.
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Bilan d'opérations réalisées par l'Atelier de Saint-Romain-en-Gal

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Résumé : Le thème de cette 9^e conférence générale, et cette année 2005, qui marque pour l'Atelier de Saint-Romain-en-Gal 25 ans de fonctionnement, fournissent l'occasion de dresser des bilans et de s'interroger : que sont devenues les mosaïques que nous avons traitées ? Et comment juger aujourd'hui certaines opérations qui ont suscité des controverses ? Cet exposé se propose de présenter un tableau des interventions réalisées depuis 1980, en développant quelques cas spécifiques, choisis pour les constats et les enseignements qui peuvent en être tirés.

Abstract: The theme of this 9th conference and the year 2005, which marks twenty-five years of work for the Saint-Romain-en-Gal workshop, provide an opportunity for evaluation and posing some questions: What has become of the mosaics we have treated? How can some of the controversial operations undertaken in the past be judged today? This presentation seeks to review the interventions carried out since 1980, going into detail with a few specific cases chosen for the findings and the lessons that can be learned from them.

Le thème proposé pour cette 9^e conférence de l'ICCM fournit l'occasion de dresser un bilan des travaux réalisés par l'atelier depuis sa création en 1980. Le propos n'est pas de mettre l'accent sur les quantités traitées au cours de ces vingt-cinq ans, mais de s'intéresser à l'état actuel des mosaïques sur lesquelles l'atelier est intervenu et de s'interroger : que sont devenues les 1600 m² de surfaces déposées ? Dans quelle mesure sont-elles accessibles aux chercheurs ou au public ? Quelle fraction reste exploitable, et à quelles conditions ? Quelle appréciation peut être faite des 1 300 m² de mosaïques restaurées, présentées en musée ou *in situ* ? Ces questions, qui ramènent aux notions récurrentes de documentation, de conservation préventive et

de maintenance, permettront de préciser le rôle et la part de responsabilité des différents acteurs de la conservation.

Par ailleurs, le bilan de certaines opérations particulières liées à des contextes archéologiques peut donner lieu à une évaluation critique : en faisant apparaître la position de l'atelier par rapport aux demandes des commanditaires et des instances décisionnelles, puis en précisant la nature des interventions matériellement réalisées et en concluant par le constat que l'on peut aujourd'hui établir, avec le recul d'une ou deux décennies.

Bilan des opérations réalisées depuis 1980

L'atelier est intervenu sur plus de deux cents pavements totalisant près de 3 000 m². La surface globale est essentiellement composée de mosaïques, les autres pavements tels que *opus sectile*, sols de *terrazzo-signinum* et dallages divers représentant un peu plus de 5 % de la totalité. Le tiers de ces opérations correspond à des interventions *in situ* d'études diagnostiques, de nettoyages, de consolidations (fig. 1), et d'établissement de documentation descriptive, graphique et photographique. Les 2 000 m² restants se répartissent en 1 300 m² restaurés – dont 900 m² issus de déposes réalisées par l'atelier – et 700 m² déposés qui n'ont pas fait l'objet d'une restauration.

Sur l'ensemble des restaurations qui concerne cent vingt pavements, le tiers correspond à des reprises de restaurations anciennes ou récentes. Ces mosaïques scellées sur des supports de ciment, de plâtre ou de résine – près d'une cinquantaine totalisant une surface de plus de 400 m² – posaient des problèmes de conservation ou de présentation qui ont entraîné leur remontage sur des supports de nid d'abeille et une remise en valeur de leur état de surface ; citons à titre



FIGURE 1 Consolidation d'une mosaïque conservée *in situ* sur le site de Plassac (Gironde). Cliché : atelier.

d'exemple la reprise du traitement de la mosaïque funéraire de Pelagius (Tabarka, Tunisie) (Chantriaux et al. 1994), incorrectement reconstituée en 1884 après avoir été brisée lors de son transport au Musée du Louvre (fig. 2, 3). Au vu des difficultés et de la lourdeur de certaines de ces opérations, le premier constat peut être de rappeler l'importance de bien mesurer l'incidence du choix des techniques et des matériaux sur le devenir des mosaïques traitées ; ce qui revient à souligner l'importance de respecter la règle de la réversibilité dans les interventions aujourd'hui mises en œuvre.

La situation des mosaïques restaurées est variable. Plus de la moitié est exposée en musée (fig. 4), ou en attente de l'être dans des salles en cours de création ou de réaménagement, mais une fraction non négligeable reste inaccessible. Près du cinquième des mosaïques traitées n'ont en effet pas encore trouvé d'emplacement pour leur exposition au public. L'absence de lieux de présentation peut traduire une insuffisance de moyens, quand il existe une disproportion entre la richesse des collections archéologiques et la taille de certaines petites communes, ou une absence de volonté commune de la part des instances concernées : collectivités, services patrimoniaux, associations locales. Ce type de situation concerne surtout les grandes

mosaïques, ou les ensembles de plusieurs pavements, pour lesquels la lourdeur des dispositifs à mettre en place en vue de leur présentation constitue un obstacle : ainsi certains musées saturés ne permettent pas de les intégrer, comme à Aix-en-Provence, où les découvertes archéologiques des trente dernières années restent en réserves. Dans ce cas, le projet d'une vaste exposition temporaire initié par le service archéologique municipal pourra peut-être convaincre les autorités locales de la nécessité de créer un lieu de présentation. Ailleurs, ce sont les aléas politiques qui empêchent l'émergence d'un musée, comme à Saint-Paul-Trois-Châteaux où le changement de municipalité a entraîné l'abandon du projet mené par l'équipe précédente. Ou c'est la complexité des problèmes à régler qui est en cause, dans les cas de reprises *in situ* notamment, comme à Saint-André-de-Rosans, où la réintégration des mosaïques à leur emplacement d'origine suppose la restauration des vestiges du prieuré dont elles proviennent, l'édification d'une structure de protection et la programmation de mesures d'entretien.

Le tiers restant regroupe les mosaïques pour lesquelles des solutions autres que la présentation intégrale en musée ou le *statu quo* ont été trouvées. Certaines mosaïques sont



FIGURE 2 Mosaïque funéraire de Pelagius (Tabarka, Tunisie) ; démontage de la restauration datant de 1884. Cliché : Paul Veyseyre.



FIGURE 3 État après la restauration effectuée en 1993 pour le Musée du Louvre. Cliché : Paul Veyseyre.



FIGURE 4 Mosaïque de l'Enlèvement d'Hylas (dépôt de la ville de Grenoble) présentée au Musée de Saint-Romain-en-Gal. Cliché : Paul Veyseyre.

ainsi présentées partiellement, faute de place suffisante pour les exposer entièrement, ce qui évidemment constitue un pis-aller, mais sans doute préférable à l'oubli total au fond d'une réserve. Quelques pavements sont présentés dans des lieux autres que sites et musées ; il s'agit le plus souvent d'espaces publics : mairies, offices de tourisme, qui suppléent l'absence de musées et évitent la dispersion du patrimoine local. Une autre partie des mosaïques est présentée dans le cadre d'expositions temporaires, et conservée en réserve le reste du temps ; à Saint-Romain-en-Gal, les mosaïques entreposées dans la réserve équipée de châssis coulissants restent accessibles sur demande aux professionnels, et au public dans le cadre de visites spécifiques donnant accès aux « coulisses » du musée. Le dernier groupe correspond aux mosaïques reposées *in situ*, de manière permanente ou saisonnière, comme à Saint-Romain-en-Gal selon le système d'exposition estivale présenté à la conférence de Thessalonique (Chantriaux et al. 1994).

Bilan des opérations de dépose

Si l'on observe maintenant le bilan des opérations de dépose, le constat est plutôt positif puisque 900 m² ont été restaurés et présentés pour la plupart au public sur les 1 619 m² déposés. Certaines restaurations suivent immédiatement le prélèvement, comme la mosaïque de Méduse découverte à Besançon¹ en 2004, restaurée en 2005 pour une exposition prévue en 2006 ; ou le panneau de Métrodore appar-

tenant à la mosaïque des Auteurs grecs d'Autun², restauré dès après sa découverte à l'état de fragments en 1990 (fig. 5, 6). D'autres attendent plus longtemps la programmation de leur traitement.

La majorité des déposes, effectuées dans le cadre de fouilles de sauvetage (fig. 7), permettent en effet de sauvegarder le moindre vestige de pavement découvert. Mais si aucune sélection ne s'applique à ce stade, ce qui – il faut le souligner – constitue une réalité qu'il convient d'apprécier à sa juste valeur, les commandes de restauration ne suivent pas systématiquement. Dans le cas d'ensembles importants, le choix des mosaïques destinées à être présentées, donc à restaurer, se porte en priorité sur les pavements les plus remarquables, délaissant les pavements les plus « ingrats », parce que trop fragmentaires, ou redondants dans des séries déjà bien représentées ; le tri s'impose alors pour des raisons de saturation des espaces de présentation, ou par limitation des sources de financement, parfois affectées à d'autres objectifs, culturels ou non, en tout cas plus médiatiques. Ce type de situation conduit d'ailleurs au constat qu'une nouvelle politique de conservation des vestiges se met en place, qui limite les fouilles à des sondages d'évaluations et s'accompagne du réenfouissement des pavements repérés.

Il n'empêche que toutes les mosaïques déposées constituent des témoins d'histoire. Même non restaurées, elles représentent un fonds répertorié et documenté, accessible aux chercheurs. Et elles restent potentiellement exploitables à des fins de restauration et de présentation, si les conditions de leur stockage assurent leur préservation. On peut citer à titre d'exemples la mosaïque de Passins (Isère), déposée en 1983 et restaurée vingt ans plus tard³ (Lavagne 2000) ; ou une mosaïque à décor géométrique prélevée en 1876 lors de travaux de terrassement pour la construction d'une ligne de chemin de fer à Sainte-Colombe-lès-Vienne, restaurée cent vingt ans plus tard. À l'inverse, certaines mosaïques récemment déposées ont été endommagées à des degrés divers par suite de négligences, alors qu'elles avaient été laissées par l'atelier dans un parfait état de conservation : déformées et fragmentées après avoir été démunies de leur support de contreplaqué, leur entoilage moisi pour avoir été stockées en extérieur, exposées aux intempéries, ou encore la moitié des tesselles détachées à la suite d'un transport vertical. Le constat, amer, serait dans ce cas d'intervenir dans le cadre des formations en conservation préventive organisées dans divers cadres institutionnels de manière à rappeler les règles de base du stockage et du transport des mosaïques.



FIGURE 5 Fragments du panneau de Métrodore à leur découverte en 1990 à Autun (Saône et Loire). Cliché : atelier.

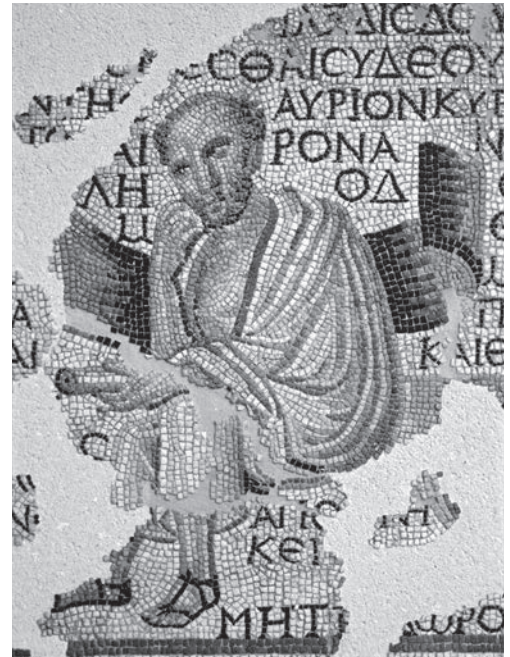


FIGURE 6 Détail du panneau après sa restauration en 1992. Cliché : Paul Veysseyre.

Cas particuliers

Parmi les déposes et les interventions effectuées sur des mosaïques conservées *in situ*, quelques opérations se distinguent par les controverses qu'elles ont suscitées. Les déposes sont en effet réalisées quand elles sont justifiées par une nécessité de sauvegarde ; mais l'atelier a refusé d'en exécuter certaines. Un premier exemple concerne la mosaïque médiévale de l'église de Cruas⁴ (Ardèche) ; dans ce cas, la dépose initialement prévue à des fins de remontage sur un nouveau support a été remplacée par une consolidation *in situ*, après que l'atelier ait diagnostiqué un état de conservation qui permettait de maintenir la mosaïque sur son mortier d'origine. Quinze ans après l'opération, la mosaïque ne présente aucun signe d'altération.

Dans un autre cas, celui d'un dallage médiéval en carreaux de terre cuite conservé dans la basilique Notre-Dame de Paray-le-Monial (Saône-et-Loire), l'architecte des Monuments Historiques demandait une dépose partielle des parties les mieux conservées, sans finalité de sauvegarde puisque le réenfouissement du carrelage devait en assurer la conservation, et alors même que les archéologues avaient mené leur fouille de manière à éviter les zones dallées. L'atelier a refusé d'intervenir, mais le prélèvement a quand même été réalisé, par un autre restaurateur.

Une autre opération a permis de retrouver le même architecte pour le traitement de la mosaïque romane du déambulatoire de l'église St-Philibert de Tournus⁵. Dans ce cas, le conflit ne concernait pas la dépose, l'état du pavement autorisant sans conteste son maintien *in situ*, mais portait sur les choix de mise en valeur. En premier lieu, l'architecte a décidé de limiter la présentation à la partie la mieux conservée de la mosaïque, alors qu'un collège de conservateurs, d'historiens, de chercheurs – auxquels l'atelier s'est associé – défendait le projet d'une présentation exhaustive de l'ensemble du pavement. Malgré l'argumentation développée autour du caractère réducteur de ce choix, l'architecte a maintenu son projet et les $\frac{2}{3}$ du pavement, conservés dans un état fragmentaire, ont été réenfouis après consolidation.

Une deuxième polémique, cette fois à l'instigation de l'atelier, s'est déclarée, à l'issue des opérations de consolidation et de nettoyage, à propos du traitement des lacunes. L'architecte souhaitait un comblement uniforme de toutes les parties de *tessellatum* disparues – avec restitution du tracé de la composition géométrique –, ce qui impliquait de détruire les réparations en mortier de tuileau effectuées pendant le temps d'usage du pavement, et de recouvrir les couches supérieures du support d'origine, conservées par endroits (fig. 8).



FIGURE 7 Dépose d'une mosaïque à Orange (Vaucluse) en 1990. Cliché : atelier.

L'application systématique d'un enduit moderne aurait par ailleurs masqué certaines marques de facture – des limites de reprise de travail notamment – et fait disparaître les zones de *tessellatum* érodées qu'il était également question de recouvrir. Diplomatiquement géré par la Direction des services municipaux, qui – par chance – suivait scrupuleusement le déroulement des opérations et a bien voulu considérer le point de vue de l'atelier, le désaccord s'est soldé par une intervention minimale, limitée au comblement des lacunes profondes et des zones fragiles par un enduit de chaux chargé de tuileau.

L'atelier n'a pas toujours eu gain de cause, et le dernier cas présenté concerne une opération que nous avons réalisée contre notre volonté. Précisons que s'il nous est possible de refuser certaines opérations dont la nature est

contestable, l'atelier effectue – sans facturation – toutes les déposes demandées par le service régional de l'archéologie dans le Rhône et en Isère, les deux départements fondateurs et gestionnaires de notre structure. Dans le cas du baptistère de Grenoble, découvert Place Notre-Dame en 1989⁶ à l'occasion du chantier du tramway, les archéologues souhaitaient effectuer une fouille sous le dallage conservé autour de la cuve baptismale, ce qui imposait de le déposer. Ce dallage, conservé sur une trentaine de m², est constitué d'une partie centrale en dalles de calcaires ocre et rose, encadrée par des blocs de brèche rouge et de poudingue gris dans les quatre absides. Son état de conservation aurait permis de le consolider *in situ*, au même titre que la cuve baptismale qui, elle, est restée en place. L'atelier a donc proposé que les fouilles soient limitées aux parties lacunaires du pavement, puis a essayé de limiter l'intervention à une dépose partielle, mais a finalement dû s'exécuter et réaliser le prélèvement total de cet ensemble monumental, avec l'objectif de reposer le dallage dans l'exacte configuration qu'il présentait à sa découverte.

L'opération a été lourde, dans tous les sens du terme, et s'est échelonnée sur six années. La dépose a été effectuée en 1992, après la réalisation d'une empreinte de toute la surface, avec un système de mousse de polyuréthane coulée dans un coffrage de bois établi selon un niveau de référence parfaitement plan. Ces contreformes ont permis de réaliser, au dos des éléments du dallage, des coques en résine époxy armée de fibres et de toile de verre, avec un repérage, en près de 300 points, de toutes les dénivellations du revers. L'ensemble, coques et dalles de pierre, a ensuite été reposé dans le baptistère avec un système de tiges filetées réglées en chaque point relevé, de manière à restituer les niveaux d'origine. Seule l'une des absides a été remontée sur un support plan en vue de son accessibilité au public. Le bilan de l'opération, à son achèvement en été 1998, a été celui d'une réussite technique, avec l'amertume d'avoir dû céder à d'autres exigences que celles dictées par des objectifs de conservation. Mais il a évolué depuis. Des problèmes de développement de micro-organismes sont en effet apparus par la suite dans la crypte aménagée pour la présentation du baptistère et de son contexte archéologique. Seul le dallage, isolé par ses coques synthétiques est resté intact, ce qui oblige à réviser le constat initial, en reconnaissant que finalement, la dépose et le remontage sur un nouveau support se sont avérés justifiés, *a posteriori*.

FIGURE 8 La mosaïque médiévale de l'église Saint-Philibert de Tournus (Saône et Loire) lors de sa découverte en 2002. Cliché : Paul Veysseyre.



Conclusion

La conclusion de cet exposé pourrait être de présenter le bilan des essais de vieillissement mis en place en 1990 pour la conférence de Palencia (Chantriaux et al. 2005). En réalité, le constat de cette expérimentation ne peut être développé pour diverses raisons : par manque de temps pour s'attacher à suivre régulièrement l'évolution des échantillons de mosaïque placés en examen, mais surtout par manque de conviction sur la portée des résultats recueillis, à savoir que les mosaïques se dégradent quand elles ne sont pas protégées ! L'opération a été engagée avec l'intention louable d'apporter une contribution à la conservation *in situ* des mosaïques. Mais l'ensemble se comporte comme une unité dont les variations constatées ne seraient sans doute pas d'une grande utilité pour être exploitables dans d'autres conditions. Ainsi, pour conclure cette présentation de bilans, la seule règle absolue dans notre domaine d'intervention, comme l'a écrit René Huyghe (1950 : 199) à propos de la restauration des peintures, est « qu'il n'existe que des cas d'espèces ».

Notes

- 1 Fouille du Collège Lumière réalisée à Besançon (Doubs) en 2004 par l'INRAP (Institut national de recherches archéologiques préventives) sous la direction de Claudine Munier.
- 2 Fouille réalisée rue de la Grille à Autun en 1990 sous la direction de Pascale Chardron-Picault, archéologue municipale. Voir le Catalogue de l'exposition : Musée Rolin. 1992. *Métrodore : un philosophe, une mosaïque*. Autun : Musée Rolin.
- 3 Fouille réalisée en 1981 à Passins (Isère), sous la direction de Michel Colardelle (Centre archéologique de l'Isère).
- 4 Campagnes de fouilles de sauvetage menées de 1983 à 1988 par Joëlle Tardieu (Service régional de l'archéologie). Travaux de restauration de l'église réalisés en 1989 et 1990 sous la direction de Francesco Flavigny, architecte en chef des Monuments Historiques.
- 5 Fouille réalisée en 2002 sous la direction de Benjamin Saint-Jean Vitus (INRAP). Travaux de restauration réalisés en 2001 et 2002 sous la direction de Frédéric Didier, architecte en chef des Monuments Historiques. Voir C. Sapin, ed., *Le décor retrouvé à Saint-Philibert de Tournus : Regards sur la mosaïque médiévale*. Tournus 18 et 19 sept. 2003. Tournus : C.I.E.R., 2004.
- 6 Fouille réalisée de 1990 à 1992 sous la direction de François Baucheron (Direction des Antiquités historiques de la région Rhône-Alpes). Travaux d'aménagement de la crypte archéologique réalisés de 1992 à 1998 sous la direction de François Botton, architecte en chef des Monuments Historiques.

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Learning from the Literature: A Review of Published Works on Mosaic Deterioration and Conservation Treatments

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Abstract: *This paper summarizes the review of the literature on causes of deterioration, treatment, and maintenance undertaken as part of the Getty Conservation Institute's Mosaics in Situ project. The literature review indicates progressive developments in methods and approaches to the preservation of mosaic pavements on archaeological sites over the past four decades. It reveals also, however, that the understanding of mechanisms of deterioration remains largely intuitive, with a significant lack of diagnostic studies. Treatments are rarely developed in response to specific deterioration or diagnostic investigations, and there is little evaluation of their efficacy over time. However, interventions are increasingly emphasizing the use of compatible (lime-based) materials, with a focus on preventive preservation and regular maintenance of mosaics in situ.*

Résumé: *Cette communication résume la documentation étudiée dans le cadre du projet sur les mosaïques in situ de l'Institut Getty de Conservation sur les causes de détérioration, les traitements et l'entretien. La revue évoque l'évolution des méthodes et des approches concernant la préservation des pavements en mosaïques sur les sites archéologiques depuis quarante ans. Elle constate que les connaissances sur les mécanismes de détérioration demeurent intuitives et que les études diagnostiques sont rares. Les traitements sont rarement conçus pour répondre à une détérioration spécifique ou à des investigations diagnostiques et leur efficacité dans le temps est rarement évaluée. Les interventions soulignent de plus en plus l'utilisation de matériaux compatibles (à base de chaux), et insistent sur la préservation préventive et l'entretien régulier des mosaïques in situ.*

The Getty Conservation Institute's Mosaics in Situ project was initiated in 1997, with the aim of improving understanding

of the causes of deterioration of in situ mosaic pavements and developing strategies and methods for their preservation (Demas 2003). A review of literature concerning the conservation of mosaics was begun with the primary objective of informing and guiding the research, testing, and training components of the project. As the review progressed, it was considered a useful resource to the mosaic conservation field as a whole.¹

Categories were established to reflect the principal issues related to mosaic conservation: deterioration; treatment and maintenance; reburial; sheltering; mosaic inventories and corpora; and training. A critical review was written for each category in order to establish the current state of knowledge and identify areas in need of further research. This paper summarizes the review of the literature on causes of deterioration and on treatment and maintenance. While we recognize that the published literature will never mirror exactly the reality of current practice and that many conservation projects and some research initiatives remain unpublished, we believe that a review of the literature is nevertheless a valid reflection of the current state of the field. A critical review of the literature through 1988 was published in 1994 (Nardi 1994a); the present literature review includes that material plus the literature that has been published since (1989–2005).

Published works on mosaics were searched on several Web-based reference databases.² Those that provided the most information were the Bibliographic Database of the Conservation Information Network (BCIN); AATA Online: Abstracts of International Conservation Literature; the ICCROM library catalog; and SciFinder®, a subscription-based research interface that allows access to Chemical Abstracts, a large collection of scientific publications. This search, limited

to articles in English, Italian, Spanish, French, and German, produced over a thousand references, which were organized according to the subject categories listed above.³ The digital record of the references was compiled using the reference management software ProCite®. The largest group of references reviewed was published in the proceedings of the International Committee for the Conservation of Mosaics (ICCM); another main source was the biennial proceedings of the Associazione Italiana per lo Studio e la Conservazione del Mosaico (AISCOM; Italian Association for the Study and Conservation of Mosaics) and other recent Italian conference proceedings. Most of the remaining references were found as individual papers in the more general conservation literature. Only one small book devoted specifically to mosaic conservation (materials and techniques for treatment) was found for inclusion in the review (Fiori and Vandini 2002).

Causes of Deterioration as Discussed in the Published Literature

The review has been divided into four categories that relate to causes of deterioration occurring in the “life cycle” of a mosaic, from its construction, through abandonment, reburial, and excavation, up to its present condition:

1. Intrinsic qualities: deterioration engendered by original construction technique and original choice of materials
2. Historic events: deterioration engendered by abandonment, burial, and excavation
3. Environmental impact: deterioration engendered by exposure to the environment
4. Human action: deterioration engendered by modern interventions and mismanagement

This categorization is far from perfect given the overlap and interrelationship of the causes of deterioration in different moments of the life cycle of a mosaic. However, it highlights and distinguishes deterioration factors that cannot be prevented (i.e., intrinsic factors and historic events) and those that can be improved through better research and management (i.e., environmental and human factors).

Intrinsic Qualities

Mosaics are composed of foundation layers of diverse types of mortars and a surface of tesserae generally made of several types of stone and, less frequently, of ceramic and glass.

Different foundation layers and variations in the different chemical and physical properties of their constituent materials can result in variable types of deterioration (under the same conditions).

Explicit correlation between the chemical-physical nature of material components and their deterioration can be found in very few publications. Examples of work in which this correlation is made are mosaics from Thebes, Greece, where the low binder (lime) to filler (sand) ratio in the mortars is reported as one of the causes of their deterioration (Karatasios, Watt, and Colston 2003: 125); and the friable mortar layer rich in ashes and charcoal at the site of Horvat Minim in Israel which is preferentially penetrated by plant roots (Neguer 2004: 251). Similarly, the mineralogical nature of the tesserae has been used to explain preferential deterioration (Lopreato, Fiori, and Perpignani 2003: 185–86 [ceramic tesserae]; Menicou, Fiori, and Macchiarola 2003: 228; García del Cura et al. 1992; Aoyagi and Foschi 1997: 820) and preferential biological attack (Altieri, Poggi, and Ricci 2003: 254; Lazzarini et al. 2004: 397).

Preferential colonization of more porous substrates by algae has been quantitatively demonstrated (McStay et al. 2001: 381). There is also a small corpus of articles presenting scientific studies characterizing stone (Bergamini and Fiori 1999) and glass tesserae (Verità 2000: 72; Fiori, Lorusso, and Vandini 2000: 23), but rarely are the studies related to causes of deterioration or to selection of treatment materials and methods.

The foundations of a mosaic play an important role in its long-term stability, and there are several examples of the differential settling of mosaics attributed to underlying archaeological features such as hypocausts, walls, or earlier hearths (Neal 1997; Michaelides 1991: 11; Novis 1985: 104); or to the original construction of the floor itself (Chlouveraki and Politis 2003: 150).

Historic Events

This category includes deterioration during abandonment and collapse or destruction, gradual natural burial, and archaeological excavation.

It is difficult, perhaps impossible in most instances, to identify when damage visible today has occurred to a mosaic. For example, many articles describe the problem of deformation of the *tessellatum*, but it is seldom evaluated in terms of when and how damage occurred. Evidence of damage caused during the initial destruction or abandonment of a site is suggested in a few examples, such as subsidence of the mosaic and

presence of lacunae attributed to the impact of architectural elements at the time of collapse due to seismic activity (e.g., Gambogi, Fontanelli, and Tuccino 1998: 154; Chmielewski 2005: 149).

Once in their buried state, mosaics may be considered to exist in a stable environment where deterioration is very slow compared to an exposed situation (Sease 2003: 69). However, various types of deterioration can occur to buried mosaics (summarized in Stewart 2004: 238–43). Mechanical deformation of the *tessellatum*, caused by differential resistance of constituent layers (*tessellatum*, bedding layer, nucleus, rudus, and statumen) to lateral and perpendicular forces may also occur during burial, and stresses exerted by overburden and surrounding structures or later rebuilding causing deformations such as bulging, sinking, and cracking have been much reported (Bassier 1978: 69; Chantriaux-Vicard 1990: 294; Cencioli et al. 1998: 179; Roby 1995: 51; Manconi and Scaleggi 1995: 115).

The chemical composition of archaeological deposits has been reported to potentially affect the condition of a mosaic (Mingarro Martín and López de Azcona 1986). It has been shown that the nature of the soil, in particular its pH, and microorganisms present in the soil can affect the predominantly calcareous mosaic components as well as other pH-sensitive materials such as glass tesserae (Fernandez 1987: 284; Chantriaux-Vicard 1990: 295; Lazzarini et al. 2004: 397). A few authors have emphasized the potential negative role of agricultural chemicals on mosaics, notably, by producing free potassium, nitrate, and phosphate ions (Aoyagi and Foschi 1997: 819; Weidmann 1987: 13; Fernandez 1987: 284; Foschi 2000: 720); and in the formation of insoluble salt crusts (Chantriaux-Vicard 1990: 286).

Even planned and professional archaeological excavations are acknowledged to cause immediate damage and also to set up conditions for future deterioration, and over the past twenty years the literature has reflected the conservation community's concern with excavation methods and the importance of conservators' involvement in archaeological activities (Costanzi Cobau 1990: 130; Muceli 2004: 357)—indeed, that conservation should be an acknowledged part of the archaeological process (de la Torre, comment in Sease 2003: 77). Upon excavation, the mosaic is suddenly exposed to abrupt changes of environmental conditions, which bring about rapid responses that often result in deterioration (Chantriaux-Vicard 1990: 296; Sease 2003: 69). The *tessellatum* becomes the interface between atmosphere and soil, where damaging processes, such as crystallization of salts and biological colonization,

take place (García del Cura et al. 1992: 473; Costanzi Cobau 1990: 130). A few articles address methods of excavation and the mitigation of damage during excavation (Roby 1995; Nardi 2004: 147); and there have been calls to halt or minimize excavation until training of conservators specialized in conservation in situ is possible (see, e.g., Al-Azm 2004: 200). Despite the general awareness of the negative effects of excavation on mosaics, actual examples of deterioration of a mosaic during or immediately after excavation are not frequently reported in the literature. A dramatic example is the rapid bulging and detachment of the *tessellatum* of a mosaic at the site of Tel Itztaba in Israel soon after excavation (Neguer 2003: 204).

One of the earliest and continuing concerns in the published literature was damage to sites from development and building construction (Bassier 1978: 68; Nardi 1986: 96; Gambogi, Fontanelli, and Tuccino 1998: 153; Karivieri 2005: 193), and both accidental discoveries and construction and redevelopment can cause considerable and irreversible damage to mosaics. The literature confirms the problem is ongoing. Accidental discovery and damage by activities such as plowing are reported (Bassier 1978: 68; Aoyagi and Foschi 1997: 819; Neal 1997: 18; Foschi 2000: 720). Although the literature indicates a move away from wholesale detachment of mosaics, dramatic large-scale detachments of mosaics still periodically occur, notably, the recent examples of the redevelopment of the Central District of Beirut, which included the lifting of more than 700 square meters of Roman-Byzantine mosaics over several years starting in 1993 (Skaf and Roby 2003: 221–28) and the emergency work at Zeugma in Turkey in advance of flooding of the ancient city by a reservoir in 2000 (Nardi and Schneider 2004).

Environmental Impact

Following the unearthing of a mosaic, many causes of deterioration from the environment (e.g., water and salts, thermal variation, and biological factors) come into play. Water and salts are the most frequently mentioned factors. Salt efflorescence on the surface of a mosaic is a phenomenon often reported in the literature, and salts in association with water are commonly identified as causing mechanical disruption of the porous materials making up mosaics (Mingarro Martín 1989: 28; Abd El-Hady 1990: 33–35; Cosh 2002: 4; Edwards et al. 2003: 103; Cencioli, Botti, and Scaleggi 1998: 178; Menicou, Fiori, and Macchiarola 2003: 228; Yiannouli, Anastasatou, and Papastamatiou 2003: 55; Fiori 2004: 11).

The source and nature of salts, the mechanism for their movements and crystallization, and their role in the

disaggregation, exfoliation, and fracturing of tesserae, and the disaggregation of mortars is, however, absent from the published literature apart from a few exceptions. Movement of water throughout a site (hydrology) has been investigated only in a few cases, including a long-term project for the monitoring of the moisture content of the mosaics and surrounding environment at Chedworth, United Kingdom (Stewart, Berry, and Staniforth 2003). The importance of the relationship between a mosaic and its subterranean environment once a mosaic is exposed through excavation has been explored in Switzerland at Orbe-Boscéaz (Weidmann et al. 2003: 173–74), where hydrological studies have been carried out to investigate the effect of groundwater and of soluble salts. At this site, testing on simulated mosaic samples and direct measurements on the mosaics identify temperature fluctuations as the principal cause of the dilations and contractions and subsequent deterioration observed on the mosaic (Flatt, Girardet, and Weidmann 1997; Weidmann et al. 2003).

The diagnostic research at the sites of Orbe-Boscéaz and Vallon in Switzerland and at Chedworth in the United Kingdom are among the best and most complete examples of integrated scientific research and are reported in groups of articles published over a period of several years on the various steps of the investigations (Weidmann et al. 2003; Guex 2003; Stewart, Julien, and Staniforth 2004). Promising and worth mentioning is the recently begun interdisciplinary research and conservation work at the important site of Piazza Armerina (Cosentino et al. 2004; Lazzarini et al. 2004; Palla and Anello 2004; Santalucia 2004).

Thermal fluctuations around freezing point associated with presence of water are an important cause of deterioration. Considerable damage can occur after only a few days of freeze–thaw cycling when water is present in the porous components and in the layered structure of a mosaic (Mingarro Martín 1989: 29) and in terracotta tesserae of *opus signinum* floors (Roncuzzi Fiorentini et al. 1985: 345). However, specific references to this type of deterioration were surprisingly few (see Bassier 1978: 69; Chantriaux-Vicard 1990: 296; Fernandez 1987: 284; Weidmann et al. 2003: 170).

The irregular surfaces of most excavated mosaics are particularly suited to microbiological colonization as they provide for localized buildup of moisture and soil and nutritive mineral sources. A general overview of biodeterioration of mosaics has been published (Monte Sila 1989). A large body of scientific literature concerning biological causes of deterioration comes from fieldwork carried out at the site of Italica in Spain. These studies have shown that microorganisms can

change the physical (notably, porosity) and chemical characteristics of the mortar and tesserae, and thereby render the mosaic more susceptible to deterioration by other factors, for example, water-related mechanisms. In addition, through ecological succession, algae or lichen can provide nutrition, moisture, and humus buildup for moss colonization, which in turn paves the way for higher plant colonization (Garcia-Rowe, Saiz-Jimenez, and Sameño 1989; Puertas et al. 1994; Saiz-Jimenez, Garcia-Rowe, and Rodriguez-Hidalgo 1991; Altieri, Poggi, and Ricci 2003: 256). Physical disruption of pavements by roots, from weeds to trees, is reported by several authors as one of the principal causes of deterioration on in situ mosaics (Villa 1978; Velocchia 1978; Bassier 1978; Chantriaux-Vicard 1990) and is mentioned often in treatment case studies.

Penetration of roots into the *tessellatum* may lead to detachment and loss of individual tesserae (Aoyagi and Foschi 1997: 819) or loss of whole areas of the *tessellatum* and deterioration of the bedding layer (Foschi 2000: 722). More significant structural damage caused by roots of shrubs penetrating below the bedding layer and causing bulging and subsequent detachment of tesserae is also found (Gambogi, Fontanelli, and Tuccino 1998: 155). Mechanical root damage leaves the mosaic open to further deterioration through the creation of voids and the disruption of the cohesion of mortar layers, including structural weakness when roots subsequently decay, and soil accumulation in cracks and voids, which leads to further plant invasion (Roby 2003: 212).

Human Action

Human factors affecting the preservation of mosaics in situ can be seen as having the greatest significance in relation to the current condition of a mosaic, as they principally concern human mismanagement of the mosaic, and are hence an avoidable form of deterioration. Human impact on mosaic preservation includes deterioration related to both the lack of preventive actions to avoid or mitigate environmental causes of deterioration⁴ and the introduction of inappropriate treatment materials and methods.

The increase of mass tourism is a danger for all sites, and its regulation should fall under site management (Melucco Vaccaro 2003: 19). Experience shows that people walking on mosaics can cause accidental damage by dislodging or abrading/eroding the tesserae, especially the softer and more porous ceramic, clay-based, and glass tesserae, but there is little documentation of this well-known process. An additional consequence of tourism is the use of water by tourist guides and tourists themselves to saturate the colors of mosa-

ics and increase their legibility (Costanzi Cobau and Nardi 2003: 331), with negative impact on the mosaics through the increase in wetting and drying cycles.

Perhaps the most insidious cause of deterioration is neglect. There are numerous examples of the abandonment of mosaics immediately after their excavation, or even after extensive conservation treatments. The lack of regular maintenance, although infrequently discussed in the published literature until two decades ago,⁵ has gradually become a concern and is now recognized as a major contributor to the rate and extent of deterioration and loss of excavated mosaics. The 1996, 1999, and 2002 ICCM conferences include references to maintenance programs now being carried out at individual sites (Nardi 2003; Margalit 2003; see also Zizola 2005), as well as initiatives for the on-site testing of maintenance methods (Piqué, Neguer, and Lucherini 2003) and the on-site training of maintenance technicians (Roby, Alberti, and Ben Abed 2005). The need for “a plan of long-term maintenance” was included as one of the recommendations of the 1999 conference (ICCM 2001, 2003).

Another human factor reported as a cause of deterioration is past interventions. While the use of inappropriate materials in the past, notably, reinforced cement supports (Bassier 1978: 70) and cement mortar repairs (Gambogi, Fontanelli, and Tuccino 1998: 154; Tripodi 1997: 238, 240), is represented in the literature, published observations of the detrimental results of such practices are in fact few in number. The use of acids for cleaning is known to have been a common practice, but only very occasional reference to their use is found (Menicou, Fiori, and Macchiarola 2003: 229; Pastorello and Schmid 1991: 59–60; Chantriaux-Vicard 1990: 286).

Treatment Interventions as Discussed in the Published Literature

Treatment is any “direct” intervention on the materials of the mosaic to clean, stabilize, and improve its aesthetic appearance; as such, treatment here does not cover the wider preventive measures of preservation in situ, such as sheltering and reburial.

At the time of the first ICCM meeting in 1977, the common response to the need to preserve pavement mosaics was their detachment followed by transfer to a museum or re-laying them on new foundations (see, e.g., Bassier 1978; Velocchia 1978). At that meeting, however, discussions about in situ conservation were already under way, and a trend away from detachment can be seen in the literature from then onward. Facilitated by improvements in in situ treatment techniques

and repeated expressions of the destructive aspects of detachment, in situ conservation is today much more common.

Over the past twenty years, there have been few articles synthesizing current practice; instead, they have focused instead on the “bigger picture,” addressing what is seen as an overriding priority: developing management strategies for archaeological sites, most notably, to address inadequate planning and the lack of resources for maintenance (Melucco Vaccaro 2003; Nardi 1994b). A schematic diagram, which both highlights the importance of following a decision-making process and emphasizes that management decisions have to be made in the wider site and regional context of a mosaic, presented at the 6th ICCM conference in 1996, illustrates this shift in perspective from the micro to the macro level (de Guichen 2003: 14; see also Nardi and de Guichen, this volume).

Treatment methods and materials historically have not been reported on in any detail in the literature, and a review of published case studies shows that this has changed only in the past ten years or so. This period also sees overall an increasingly uniform approach to the in situ treatment of mosaics. Methods for intervention seem to be restricted largely to mortar repairs, grouting, and cleaning, with very few references to interventions more common in the related fields of wall painting and stone conservation (e.g., surface protection, consolidation, and desalination).

The majority of treatment detail found in the literature describes the use of lime-based materials for mosaic stabilization, indicating widespread use of slaked and hydraulic limes. These materials are used for a variety of stabilization operations, including infilling of lacunae and tesserae interstices, resetting of detached tesserae, and injection grouting (e.g., Roby 1994; Aoyagi and Foschi 1997; Demitry 1994; Nardi 2004). The publication of ICCROM’s testing of a grout for stabilizing mosaics in the 1980s (Ferragni et al. 1985) not only helped to turn the tide toward in situ conservation by providing the technical means to do so as an alternative to detaching them, but was also the precursor to case studies reporting the use of injection grouting (Demitry 1994: 166; Roby 1994; Albini, Costanzi Cobau, and Zizola 1996: 4).

The use of synthetic materials for stabilization treatments is only occasionally mentioned and is limited to the reattachment of tesserae and occasionally as an additive for grouting (Roby 1994: 35; Ferragni et al. 1985: 93). Experimentation with synthetic organic materials seems to have been in general brief (see, e.g., Bassier 1988). Recently, the first handbook devoted to mosaic conservation was published; it includes a comprehensive list of materials potentially suitable for use in mosaic

conservation and a brief description of the processes of documentation, preconsolidation, cleaning, repairs, stabilization, and protection (Fiori and Vandini 2002: 69–74); however, few of these materials appear in the literature on in situ mosaics.

Materials that do occur infrequently in the literature include aqueous cleaning solutions (EDTA, ammonium carbonate, the disinfectant/surfactant NeoDesogen (benzalconium chloride) (e.g., Cenciaioli, Botti, and Scaleggi 1998: 179); adhesives and consolidants, including acrylic copolymers and silicates (e.g., Di Stefano 1997: 11); and, very rarely, surface hydrorepellants (e.g., Tripodi 1997: 242). Biological activity, from microbiological growth up to plant roots, has over time been controlled by a variety of chemical methods. Of particular interest are two projects comparing the efficacy of biocides during in situ testing (Monte and Roncuzzi Fiorentini 1989; Altieri, Poggi, and Ricci 2003) and laboratory testing of the effect of different biocides on tesserae of various stone types (Mambelli et al. 1989).

The presentation and reintegration of losses, or lacunae, in mosaics has been a subject of much debate over the years, although confined largely to practitioners in Italy. The subject is responsible for a significant proportion of the literature on mosaic conservation, including the proceedings of a meeting dedicated to the subject in Italy in 2002 (Foschi, Lugari, and Lucagni 2003). While the issue of compatibility of materials, and their possible performance and durability over time, is occasionally mentioned (e.g., Laurenti 2003), most articles are concerned with aesthetic and historical issues of presentation (e.g., Philippot 1978; Lugari 1998; Foschi, Lugari, and Lucagni 2003).

Testing programs to develop treatment interventions are rarely discussed in the literature. In addition, very few articles that evaluate past treatment interventions have been published. The performance over time of repair work and the impact of any treatments on the original mosaic materials are rarely evaluated but of extreme importance. Mention should be made of the enormous potential of noninvasive tools for both diagnostic investigations and monitoring of condition and treatments over time (techniques adopted from the field of geophysics such as georadar, tomography, and thermography have been used to assess condition but, again, with no specific link to subsequent treatment choices) (Iannucci et al. 1997; Schirripa Spagnolo, Ambrosini, and Paoletti 2003; Cosentino et al. 2004).

Conclusion

Review of the large and heterogeneous body of literature on mosaic deterioration and treatment has indicated that some

significant changes have taken place in the past three decades. First, there has been a general increase in the number of articles dealing with mosaic conservation not only in terms of treatment case studies, written for the most part by conservators and art historians, but also in terms of scientific research, protection interventions, and site management, written by managers, archaeologists, scientists, architects, and engineers. This reflects the increased interest and attention to this type of heritage and the emergence of a more multidisciplinary approach to mosaic conservation.

The more striking trends in the field as reflected in the literature over the past few decades can be summarized as follows:

1. Publications on the conservation of mosaics in situ, on their original bedding foundations, have become predominant over those discussing detachment and treatment of detached mosaics.
2. Treatment interventions in situ reported in the literature over the past two decades are almost exclusively limited to lime-based interventions (mortars and grouts) and localized use of synthetic polymer adhesives, with little use of consolidants, surface protectants, or other materials found commonly in the allied fields of stone and wall painting conservation. The use of cement is no longer reported in the literature.
3. There has been an increase in publications on scientific aspects linked to the study of deterioration, reflecting increasing awareness of the need for diagnostic studies to address deterioration problems. However, few studies that integrate analytic studies with on-site management and treatment interventions have been published. Exceptions, notably at Orbe-Boscéaz and Vallon in Switzerland, at Chedworth in the United Kingdom, and, most recently, at Piazza Armerina, are noteworthy for multidisciplinary teamwork and long-term commitment to research and conservation (given the difficulty and the scale of research required for diagnostic investigation at sites, a good case study requires extensive multidisciplinary research and can seldom be represented in a single article).
4. There have been an increased number of articles advocating more holistic, preventive approaches to mosaic conservation, stressing the importance of planning and management of a site, and attempting

to move the emphasis away from single-site treatment of mosaics to viewing the mosaic resource as a whole, on both the site and the regional scale.

5. "Lack of maintenance" has become predominant in the published discussions on causes of deterioration, especially over the past ten years, and examples of research and training initiatives to support regular maintenance cycles have recently appeared in the published literature—although few examples of programs of maintenance have as yet been reported on.
6. The evaluation of the efficacy of treatment interventions over time is noticeably lacking in the published literature, and studies for the selection of suitable materials and methods for treatment are extremely rare.

In many aspects, mosaic conservation as seen through the literature is following the trends of immovable heritage conservation and slowly shifting toward better site management and planned conservation maintenance. It is hoped that this will include more widespread training of conservation and maintenance professionals and the development and application of objective scientific techniques to support diagnostic studies and to monitor mosaic conditions over time.

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Notes

- 1 The literature review in its entirety will be available online in the near future.
- 2 The literature search intentionally focused on mosaics, thus excluding the literature on stone and wall paintings conservation that would be relevant to mosaic conservation. This choice was made in order to understand the state of in situ mosaic conservation. Also, while the project bibliographic database includes a large number of publications concerning the lifting and re-laying of mosaics and the treatment of detached mosaics, these were not included in the literature review given its focus on in situ conservation of floor mosaics. For the same reason, the literature on wall mosaic conservation has generally been excluded, with the exception of illustrative articles focusing on analysis of constituent materials and deterioration of excavated fragments.
- 3 Over two hundred references to one or more of the categories of deterioration, treatment, and maintenance were reviewed in detail for these parts of the literature review.
- 4 Sheltering and reburial of mosaics are dealt with separately in other sections of the literature review; recent publications that discuss these interventions are Aslan 2003; Solar 2003; Stewart, Berry, and Staniforth 2003 (shelters); Roby 2003; Stewart 2004: 240; Nequer 2004 (reburial).
- 5 Only 2 out of 400 titles reviewed by Nardi (up to and including 1988) mentioned lack of maintenance as a cause of deterioration (Nardi 1994a: 345).

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Orbe-Boscéaz (Canton de Vaud, Suisse) 1975–2005 : 30 ans de réflexions sur la conservation d'anciennes et de nouvelles mosaïques

Denis Weidmann

Résumé : *Les mosaïques d'une villa romaine au nord des Alpes ont été découvertes, maintenues in situ sur leur support d'origine et mises sous abri dès 1841. Des menaces sur le site et la dégradation des mosaïques ont nécessité des interventions dès 1975. Les conditions de conservation et les altérations sont étudiées méthodiquement depuis 1993. Le résultat des études définit les programmes individuels d'intervention sur les pavements, ainsi que les modifications apportées aux abris.*

Abstract: *The mosaics from a Roman villa in the northern Alps were discovered, maintained in situ on their original support, and sheltered in 1841. In 1975, threats to the site and the degradation of the mosaics made interventions necessary. The conditions under which the mosaics are conserved and the alterations they have suffered have been methodically studied since 1993. The results of the studies determine the individual intervention programs on the pavements, as well as the modifications made to the shelters.*

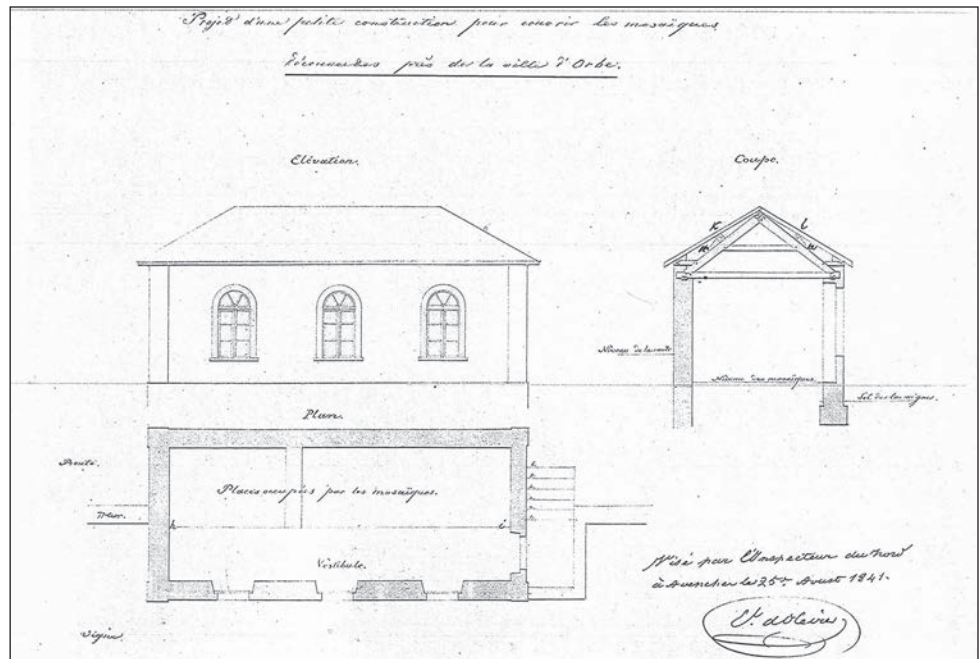
Les neuf mosaïques de la villa gallo-romaine d'Orbe constituent un ensemble caractéristique des situations de conservation *in situ* au nord des Alpes (Von Gonzenbach 1961: 173–199). Découvertes dès le milieu du 19^e siècle, la plupart ont aussitôt fait l'objet de mesures de protection et de conservation qui apparaissent aujourd'hui comme très en avance sur leur temps (Weidmann 1987). Pour garantir la préservation d'un patrimoine important dans un paysage rural, il a été décidé en 1841 et 1862 de déplacer le tracé d'une route et de construire deux bâtiments de protection en maçonnerie pour soustraire les mosaïques aux influences climatiques, assurer leur sécurité et permettre leur présentation (fig. 1). Les mêmes interventions de protection ont été répétées à deux reprises sur le site au 20^e siècle, mais avec une moindre qualité et efficacité.

Des travaux d'entretien et de conservation ont été effectués à diverses reprises sur les mosaïques *in situ* au cours du 19^e et du 20^e siècle, avec des méthodes et matériaux en usage dans les périodes correspondantes. Leur bilan fait apparaître que les interventions du 19^e siècle – réalisées par des artisans des métiers traditionnels de la maçonnerie et de la pierre – conservent une remarquable compatibilité avec les matériaux et structures antiques. En revanche, les travaux de la première moitié du 20^e siècle ont entraîné une partie des problèmes d'altération observés.

La conservation du site

A partir des années 70, le projet d'un tracé d'autoroute affectant la région des mosaïques a fait reconsidérer la situation locale. La nature du site et son extension étaient encore indéterminées, l'exploration archéologique du périmètre n'ayant jamais été entreprise. Des photographies aériennes réalisées à la faveur de la sécheresse de l'été 1976 ont livré très opportunément le plan complet du site, d'une superficie de 16 hectares, ainsi que la disposition générale de l'immense résidence à laquelle appartiennent les diverses mosaïques (Flutsch, May Castella et Paratte 1997). Le constat de l'existence d'un site de grande ampleur, préservé dans le terrain et doté de plusieurs mosaïques de haute valeur, encore *in situ*, a suscité une politique générale de conservation de la villa, avec la perspective d'une mise en valeur. Le premier effet de cette orientation a consisté en un choix de tracé routier ménageant le site, et permettant à la même occasion de supprimer la route qui l'oblitérait encore. Ces travaux ont été associés à un programme d'exploration de la *pars urbana* de la villa (environ 250 × 80 m), conduit par l'Université de Lausanne. Le site, entièrement arasé et conservé

FIGURE 1 Projet du premier bâtiment de protection des mosaïques réalisé en 1841 par l'ingénieur des Ponts et Chaussées du Canton de Vaud.



sous une très faible épaisseur de terrain labouré, a été fouillé en 19 étapes annuelles, de 1986 à 2004. L'état de conservation des vestiges exposés aux activités agricoles a été contrôlé et il a été procédé au réenfouissement méthodique des structures dégagées. La protection du site a été résolue en faisant acquérir l'emprise de la villa par l'État et en proscrivant dorénavant le labourage et la culture du terrain.

Pour les mosaïques, en plus de la protection générale, les acquis directs sont la découverte d'un nouveau pavement (Achille à Skyros), la connaissance de leur contexte archéologique et architectural, ainsi que leur datation (fig. 2).

La conservation des mosaïques

On a vu que les questions de conservation ont constamment préoccupé les responsables. Des décollements et cloquages sont régulièrement apparus une vingtaine d'années après la mise au jour de chaque mosaïque, appelant des interventions ponctuelles. La reprise en main du site, dans les années 1970, a été associée à un nouvel examen de l'état des pavements, qui présentaient tous des signes inquiétants de dégradation. Avant toute intervention, il a été procédé à un inventaire des connaissances et documents relatifs au site, et en particulier aux interventions et restaurations antérieures. Les insuffisances documentaires et l'imprécision des descriptions font qu'il a rarement été possible d'identifier les emplacements des travaux et leur justification.

Notre inexpérience en ce domaine nous a amenés à solliciter des expertises extérieures, dont celle de Claude Bassier, de Périgueux, en 1978.

Il a aussitôt identifié les principaux facteurs de dégradation, liés à l'évaporation et à la concentration des sels. La solution préconisée a été de procéder à une dépose générale et à un transfert sur panneaux, assurant à la fois la sécurité des pavements et leur indépendance des conditions du sous-sol.

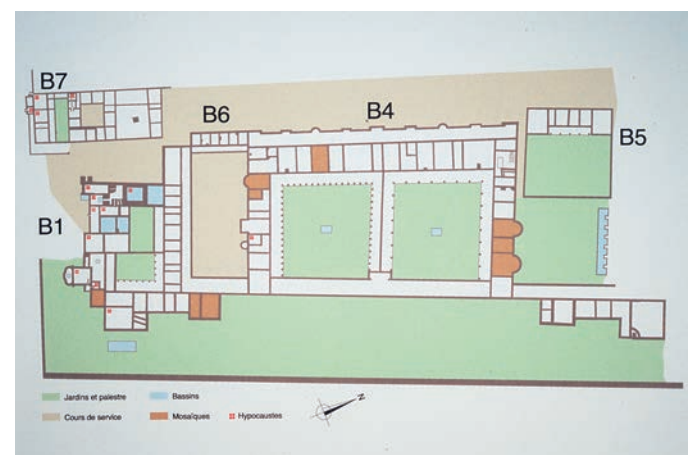


FIGURE 2 Plan d'interprétation de la *pars urbana* de la villa après les fouilles méthodiques. En foncé : pièces à mosaïques conservées. Longueur du bâtiment : 250 m.

La proposition n'a pas été suivie, en raison de son coût élevé et du changement considérable de l'aspect des mosaïques qui en aurait résulté si elles avaient été mises à plat sur des supports modernes. Les pavements *in situ* présentent en effet des tassements et irrégularités qui témoignent de leur longue histoire et de leur authenticité.

Simultanément, la prise de connaissance générale du site environnant et de sa qualité donnait beaucoup plus de cohérence à la recherche d'un maintien général des éléments dans leur contexte. Nous avons ainsi suivi les résolutions de la 4^e conférence ICCM de Soria (1986).

Études, analyses et décisions

Les méthodes de traitement pour une conservation durable dans la situation spécifique d'Orbe n'étant pas établies d'emblée, nous avons engagé une analyse générale de la situation et de l'état des mosaïques, pour comprendre les causes des altérations constatées. La découverte d'une nouvelle mosaïque en 1993, qui n'avait pas subi l'évolution historique de ses voisines longuement exposées, incitait à définir des conditions de conservation non dommageables et durables.

De nombreuses études et expérimentations ont été conduites, sur plusieurs cycles annuels (Weidmann et al. 2003). Elles ont conduit à une définition de certains paramètres limites pour la conservation visible (Flatt, Girardet et Weidmann 1997) ainsi qu'à des décisions d'intervention et de traitements, selon l'évolution individuelle de chaque mosaïque et les conditions que peuvent offrir les abris (Fischbacher et al. 2003 ; Flatt et Girardet 2000 ; Weidmann et Girardet 2005).

Un premier groupe d'études a eu pour objet l'évolution des cycles climatiques, sur plusieurs années, sur le site, dans l'ambiance des abris et dans une des mosaïques sujette à d'importantes déformations (fig. 3). La corrélation des mouvements du pavement et des variations climatiques a montré la nécessité de stabiliser les conditions dans les pavillons, par des travaux d'isolation et par la suppression de l'insolation directe sur les pavements.

Simultanément, les caractéristiques des matériaux et des mosaïques (calcaires et mortiers) ont été analysées, pour apprécier l'importance des variations de l'humidité et de la température pour leur dilatation ou contraction.

L'étude des teneurs en sels et en eau, à diverses profondeurs dans les sols et dans les mosaïques, ainsi que l'hydrogéologie du site, ont mis en évidence les différents états physico-chimiques actuels (fig. 4). Il en a résulté un modèle

explicatif des phénomènes qui ont conduit à l'état des différents pavements et à une description des évolutions en cours. Des indications précises ont ainsi pu être données pour éviter les conditions critiques amenant les altérations constatées.

Ces résultats ont bien entendu conduit aux différentes décisions d'interventions, dont le programme se poursuit depuis plusieurs années. Les mesures générales qui ont été prises concernent avant tout le drainage du site et des abris, la stabilisation climatique et la limitation des taux d'évaporation dans les mosaïques.

Deux installations expérimentales de gestion des flux d'humidité atmosphérique fonctionnent dans les deux anciens abris, stabilisant l'état de deux importantes mosaïques.

Les nouvelles conditions sont suivies par des mesures de contrôle et par des analyses, pour vérifier les effets souhaités.

Un processus de séchage lent est en cours depuis plusieurs années pour la mosaïque nouvellement découverte, pour permettre sa consolidation en place et sa présentation. Un abri répondant aux conditions de conservation adéquates est à définir et à réaliser pour cet objet. Les mesures particulières de conservation et d'intervention ont pris la forme soit de dépôt et de transfert sur de nouveaux supports, pour les trois mosaïques ou fragments qui avaient dépassé les seuils critiques (taux de salinité, altération des matériaux, décollements généralisés), soit de conservation *in situ*, sur support d'origine (fig. 5). À ce jour, la situation de six des mosaïques du site est rétablie et permet leur présentation au public.

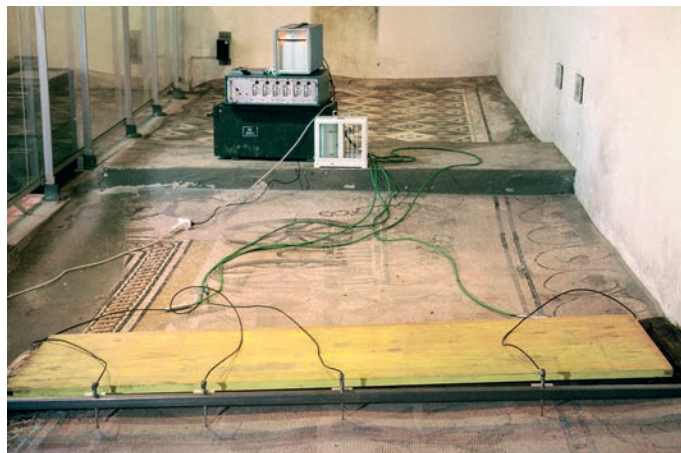


FIGURE 3 Enregistrement des déformations d'une mosaïque et des variations climatiques en 1993.

FIGURE 4 Tableau général des analyses des teneurs en eau et en sels solubles (SO_4^{2-} , NO_3^- , Cl^- , K^+ , Na^+) pour les mosaïques n° 3, 5, 6, 8 et 9 pour diverses profondeurs. Les mosaïques 3, 5 et 6 ont été déposées.

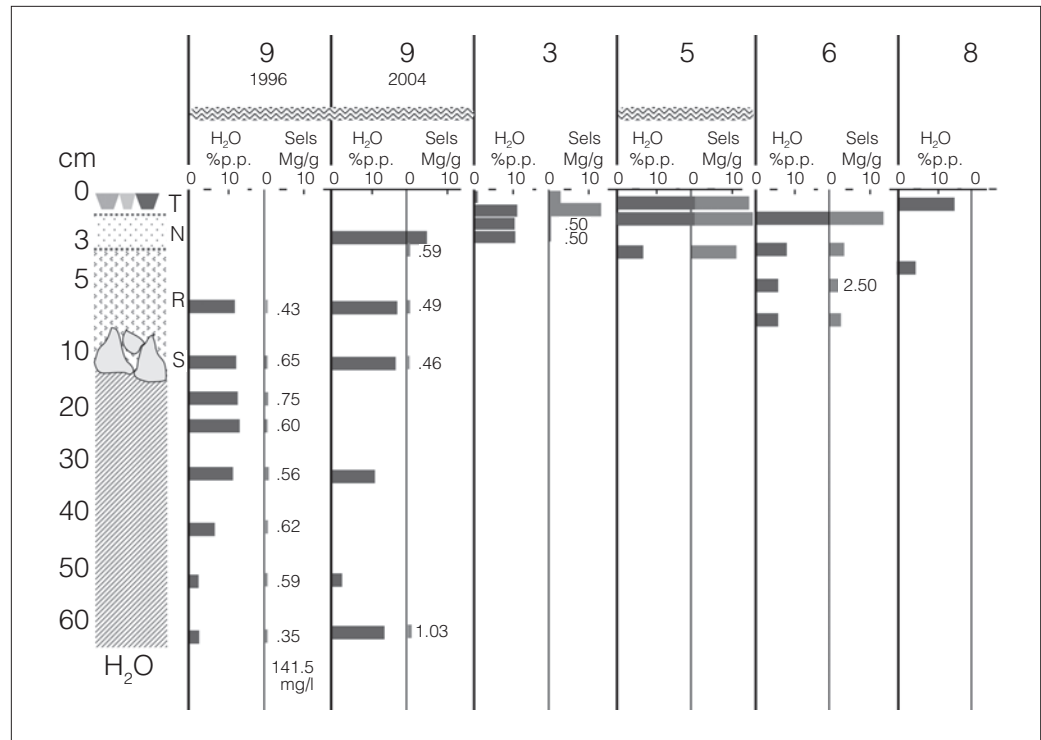


FIGURE 5 Après consolidation par injections, nettoyage des surfaces par micro-sablage pour éliminer les restes des anciens traitements.



En conclusion de cette expérience d'intervention continue sur trois décennies, nous dégageons le bilan suivant :

- Le traitement des mosaïques est indissociable de celui du site dans son ensemble ;
- Seule une analyse approfondie de la situation et de l'état des objets peut orienter les mesures à prendre ;
- La complexité des phénomènes qui affectent les objets à conserver *in situ* impose de considérer les cas individuellement ;
- La lenteur des processus dans le terrain impose un suivi et des contrôles à long terme.

Nos partenaires et mandataires pour ce projet sont les responsables et collaborateurs des institutions suivantes :

- Expert-Center pour la conservation du patrimoine bâti, Lausanne et Zurich ;
- Laboratoire de géologie de l'École polytechnique fédérale de Lausanne (EPFL) ;
- ABA Geol - Payerne ;
- Weinmann - Énergies - Echallens ;
- Laboratoire du Musée Romain - Avenches.

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Villa of the Birds Five Years Later: Early Roman Mosaics in Alexandria, Egypt

Jarosław Dobrowolski

Abstract: *In 1998–99 the mosaic floors of an early Roman villa in Alexandria, Egypt, were conserved in situ. This was a project of the American Research Center in Egypt, financed by USAID and carried out in cooperation with the Egyptian Supreme Council of Antiquities and the Polish Center of Archaeology in Cairo. This paper addresses the position of the mosaics as a part of the larger archaeological site five years after their conservation was completed. Included are a review of the mosaics' display, the design principles of the protective shelter compared to the actual visitation patterns, the maintenance needs for the mosaics and the shelter, and the condition of the mosaics after five years.*

Résumé : *En 1998–1999, des pavements en mosaïques appartenant à une villa romaine à Alexandrie, en Égypte ont été conservés in situ. Ce projet de l'American Research Center en Égypte a été financé par l'USAID et mis en œuvre avec le Conseil Suprême des Antiquités d'Égypte et le Centre archéologique polonais du Caire. Cette communication aborde les mosaïques dans le contexte plus large du site archéologique cinq ans après leur traitement de conservation, ainsi que la mise en valeur des mosaïques, la conception de l'abri par rapport à la fréquentation actuelle, les besoins d'entretien des mosaïques et de l'abri et l'état des mosaïques cinq ans plus tard.*

For many centuries after its founding by Alexander the Great in 332 B.C.E., Alexandria, then the capital of Egypt, was one of the world's finest and most important cities. In the Middle Ages, however, it was reduced to the status of a small and insignificant harbor town. When the city regained its importance in the nineteenth and twentieth centuries ancient Alexandria was buried deep beneath the expanding modern town. It is for this reason that the site of Kom al-Dikka,

under excavation by the Polish Center of Mediterranean Archaeology since 1960, is so important: it is the only fragment of the ancient city that can be seen today. The site covers about 40,000 square meters (4 ha) in the center of both modern and ancient Alexandria. From the fourth or fifth century C.E. onward, it housed public buildings, including a huge bath complex complete with gymnasia and service facilities and a series of academic auditoriums, the biggest of which is the "Roman Theater." The site also includes part of a district composed of modest residential houses and workshops. Below these monuments lies a district of rich urban villas dating from the first to the third century C.E. These buildings were destroyed in antiquity and their rich mosaic floors buried under rubble, which preserved them.

In 1998–99 the American Research Center in Egypt conserved and displayed in situ a set of mosaic floors from one villa. The project was financed by the U.S. Agency for International Development (USAID) and carried out by a team from the Polish Center of Archaeology in Cairo in cooperation with the Egyptian Supreme Council of Antiquities (SCA). The technical aspects of the conservation were presented by Ewa Parandowska, the project's chief conservator, at ICCM's seventh conference, in Arles in 2000 (Parandowska 2003). More than five years after completion of the project, the displayed mosaics have become a fixture within the broader landscape of the site.

The mosaics were first discovered in the 1970s in trenches excavated in the area of late Roman (Byzantine) buildings and reburied (fig. 1). The first important decision to be made before the work started in 1998 was choosing which mosaics to display. The decision to present a set of mosaics belonging to a single house determined the extent of the reexcavation as well



FIGURE 1 The site in 1997, before the inception of the mosaics conservation project. Photo: Robert (Chip) Vincent.

as the location and size of the protective shelter to be built. It was not possible to excavate the entire house, as more than half of it lies buried under a tall escarpment, on top of which stands Alexandria's main Fire Brigade compound. The area ultimately excavated and included within the shelter measures 15 by 12 meters and covers less than one-third of the original building, the extent of which can be determined from the grid of regular streets and building lots identified during the excavations (fig. 2). Because of the subject matter of a spectacular mosaic floor in it, the house was named Villa of the Birds (fig. 3). Other floors included animal, floral, and geometric decorations in mosaic, as well as a partially preserved *opus sectile* floor in the house's onetime triclinium. Ruins of late Roman houses, restored in the 1980s, stood over the remnants of the villa. These houses were built about one hundred years after the villas were abandoned and follow a different street grid. Their foundations stopped just short of reaching the earlier floors, which made the survival of the mosaics possible.

The design of the shelter over the mosaics, which are presented in situ, is a crucial element of the presentation. The architect, Wojciech Kołataj, a conservation architect who was also the project director and had overseen restoration work on the site for many years, decided to incorporate the late Roman structures into the shelter by using some of them as its walls. Although some structures located directly above the mosaics had to be removed, this design permitted the preservation of many of the later walls, thus retaining their relationship to the

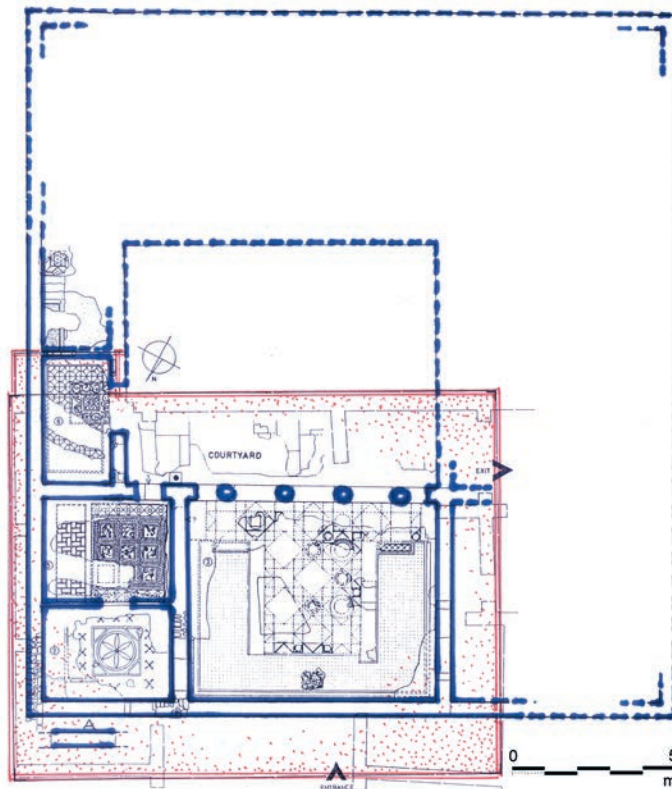


FIGURE 2 A sketch plan of the original extent of the house (in blue) and the shelter over the excavated mosaics (in red). Sketch: Jarosław Dobrowolski, based on a plan by Wojciech Kołataj.



FIGURE 3 Mosaic floor panel with purple gallinule (*Porphyrio porphyrio*). The Egyptian subspecies is depicted. Photo: Robert (Chip) Vincent.

FIGURE 4 The shelter over the Villa of the Birds. Photo: Jarosław Dobrowolski.



earlier villa. It also allowed for the sizable structure of the shelter to be less obtrusive in the landscape of the site (fig. 4).

An important consideration was to make the shelter a single undivided space without internal columns. This was important for the presentation of the mosaics, as well as for the aesthetic appeal of the interior. Building a roof over a span of 12 meters requires the use of girders or similar structural elements, which in most circumstances is not a big engineering challenge. In this case, however, because it was not possible to bring heavy equipment to the site, innovative thinking was required to build the roof over the fragile mosaics, which, adding to the difficulty at hand, were simultaneously under conservation. The girders were welded from smaller pieces on a platform built at the level of the roof and then rolled one by one into their positions over steel beams that served as rails for this operation, later being used as supports for the finished roof. The grade outside the shelter corresponds to the late Roman level, and it is from this level, about 1.50 meters above the mosaic floors, that visitors see the mosaics from viewing galleries constructed of steel beams. This, in addition to the walls made of huge glass panels that are discreetly framed and the lightweight structure of the roof, has resulted in a light and spacious interior that does not overwhelm the displayed mosaics (figs. 5, 6).

The design and construction of the shelter was a continuous process of discussion among the architect, the con-

servation team, and the American Research Center, as well as USAID, the funding body. Various aspects of the overall design were discussed and refined in numerous on-site meetings, usually requested by the architect. This concerned a multitude of questions, for example, the exact size and position of the shelter, the advantages of a single-space interior versus the increased difficulty of constructing it, and even the color of the roof cover. In the latter case, the options discussed were a roof that would be reminiscent of ancient roof tiles or one that would be neutral and unimposing in the landscape while clearly recognizable as a modern structure. The latter option was chosen.

Conservation always includes an element of surprise that requires flexibility on the part of the conservation team. In this case, a previously unknown mosaic of superb quality was discovered outside the limit of the designed shelter (fig. 7). To include it in the display, an extension to the shelter was built, its reinforced concrete walls forming a cave under the tall escarpment behind the shelter. Safety considerations determined how much of the mosaic could be displayed.

Protecting the mosaics from dampness was a major issue. Waterproof insulation protected the shelter from water coming down the escarpment. However, though a rainwater disposal system using the ancient sewage channels was thoroughly designed, moisture from the ground remained a problem. This was mitigated by an aeration system of perforated

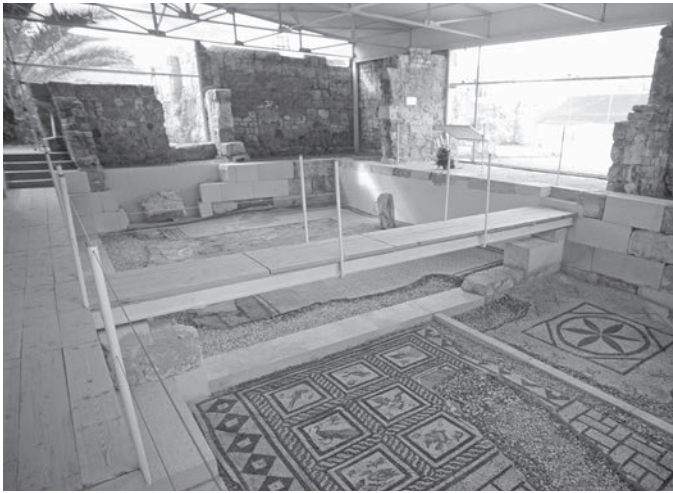


FIGURE 5 Interior of the shelter. Photo: Robert (Chip) Vincent.

pipes buried in trenches filled with nonporous gravel that was installed around the excavated mosaics. This allows moisture to evaporate from the ground through the pipes rather than through the mosaics' surface.

With the conservation completed, an opening ceremony was held on January 21, 2000, and the mosaics display was opened to the public. The exact number of visitors to the Kom al-Dikka site is difficult to obtain, but according to the SCA's on-site inspectors, more than ten thousand people visited in 2004, most of them foreigners. In peak season about three hundred people arrive per day. Only some sections of the huge Kom al-Dikka site can be visited at present, and the main attraction continues to be the Roman Theater. Tickets for the Villa of the Birds are sold separately at the same counter that dispenses tickets for the Roman Theater, but only a fraction of the tourists—one thousand per year, or roughly 10 percent—include the villa in their itineraries. The SCA assigned five inspectors to be responsible for both the mosaics display and the excavations carried out by the Polish team elsewhere on the site. This reflects the fact that the maintenance of the mosaics is largely considered the responsibility of the Polish Center, and indeed the Polish team has continued to care for the mosaics after the USAID-funded project ended.

The shelter performs well and requires only routine maintenance or small-scale improvements, such as those made to the water disposal spouts and introducing one more operable window for better ventilation. Penetration of moisture from the ground remains a persistent problem, however. In 2004 the Polish Center replaced the aeration drainage around



FIGURE 6 Interior of the shelter. Photo: Robert (Chip) Vincent.

the mosaics with perforated pipes of a bigger diameter, which greatly reduced the scale of the problem. However, soluble salts, carried by water and left on the surface when water evaporates, continue to form light efflorescence in some areas. Periodically, the Polish team removes the salts mechanically,



FIGURE 7 Floor mosaic with an *emblem* of a panther. The ancient repair may reflect an intentional change from a hunting scene into a Dionysiac emblem. Photo: Robert (Chip) Vincent.

FIGURE 8 Eastern part of the Kom al-Dikka site after completion of the project in 2000, with the shelter over the Villa of the Birds mosaics. Photo: Robert (Chip) Vincent.



by gently brushing them away. The mosaics are then cleaned with ethyl alcohol to protect against fungi. The SCA takes care of the daily operation of the display, which requires only minimum maintenance. It is worth noting that smoking is not permitted in the shelter, which is important in a country where cigarette smoking is an omnipresent custom.

In addition to the threats posed to the mosaics by natural factors such as rainwater and moisture in the ground combined with the presence of soluble salts, the location of the site in the center of the modern city poses some problems. The Alexandria Fire Brigade, itself located in a fine historic building (although younger by some eighteen hundred years than the Villa of the Birds), can be a troublesome neighbor. Its barracks, bordering on the site, have in the past been the source of massive water leakage and of a considerable amount of garbage thrown onto the site. Huge amounts of water discharged by the firefighters during their training drills also end up on the site. These problems have significantly diminished in recent years, largely as a result of persistent explanations to the firefighting authorities of the value and importance of the site and the potential threats to it. This is an example of the crucial importance to preservation of raising awareness

of issues related to the protection of cultural heritage among people who live in proximity.

Another factor that might have contributed to reducing the abuse of the site was the change in its perceived status brought about by the landscaping of the area next to the Villa of the Birds. As part of a large-scale upgrading of the city district, the governor of Alexandria stepped in and had grass planted on the slopes of the deep excavated pit in which the ancient ruins stand. This change, prompted by the work on the Villa of the Birds, radically transformed the appearance of the site (fig. 8).

In conclusion, the lessons learned from the experience of conserving and displaying the Kom al-Dikka mosaics can be summarized as follows:

- When mosaics are conserved and displayed in situ in a shelter, the shelter's architectural design is vitally important. It is not just an appendage to the conservation project but also a crucial element of the display. It requires a highly skilled professional architect, preferably one with knowledge of the site and local conditions. The project must also allow for some flexibility

in the implementation of both the conservation and the design. Conservation work inevitably involves elements of surprise and experiment, and this has to be taken into account when structuring the project.

- It is essential that the long-term preservation of the conserved mosaics be overseen by permanent custodians who are both physically and institutionally present on-site. Conservation is a continuous process rather than a onetime effort with definitive and permanent results.
- Conservation projects, in this case a display of mosaics, are not isolated from their surroundings and their human environment. This can be an advantage, but it can also pose dangers.
- Finally, the flow of tourist traffic is governed by its own rules, making it difficult to predict the number of visitors and patterns of visitation.

These conclusions are hardly surprising, since the conservation of mosaics is not fundamentally different from other forms of protection of cultural heritage.

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Lessons Learned in Theory and Practice of Mosaic Treatments: The Case of the Wall Mosaics in the Church of the Holy Apostles, Thessaloniki, Greece

Charalambos Bakirtzis, Pelagia Mastora, Styliani Vassiliadou, and Nikos Pitsalidis

Abstract: *This paper examines the theory and practice of small-scale, noninvasive, and mostly reversible interventions carried out on the mosaic decoration in the Church of the Holy Apostles in Thessaloniki. These interventions involved strengthening the mosaics' attachment to the masonry using Plexiglas anchor rivets and solvent cleaning of the surface to remove grime and soot. In addition to improving the condition of the mosaics, the results have enhanced the spiritual atmosphere of this Byzantine church.*

Résumé : *Cette présentation traite de la théorie et de la pratique des interventions à petite échelle, non invasives et pour la plupart réversibles, réalisées sur le revêtement en mosaïque dans l'église des Saints Apôtres à Thessalonique. Ces interventions ont amélioré l'état des mosaïques en renforçant leur adhésion à la maçonnerie par moyen de rivets en Plexiglas et en procédant au nettoyage de la surface avec un solvant pour éliminer l'encrassement et la suie. Les résultats ont renforcé l'atmosphère spirituelle de cette église byzantine.*

The mosaics in the Church of the Holy Apostles in Thessaloniki, Greece, are among the few surviving mosaic ensembles of the Palaiologan era (1261–1453) and some of the last examples of that genre in Byzantium. The church, a cross-in-square ambulatory type, was the *katholikon* of a large Byzantine monastery dedicated to the Virgin Mary that stood beside the west wall of the city. Its founding and mosaic decoration are attributed to Niphon, patriarch of Constantinople (1310–14), though more recent views by Peter Kuniholm and Cecil Striker, based on dendrochronology carried out on some of the church's timbers, bring the date forward to 1329 (Diehl, Tourneau, and Saladin 1918: 189–200; Xyngopoulos 1953b: 726–35; Rautman

1984: 312–19; Demetriades 1985: 307–8; Nikonanos 1986: 10–12; Kuniholm and Striker 1990: 1–25). The mosaics covered the superstructure of the *naos* above cornice level, more or less following the established iconographic program of Byzantine churches (Xyngopoulos 1932: 133–56; Xyngopoulos 1953a; Nikonanos 1986: 34–55). Parts of the following mosaics survive today: Christ Pantokrator and the prophets in the main dome; the evangelists in the pendentives (fig. 1); six *dodekaorton* scenes in the barrel vaults (fig. 2); the Dormition of the Virgin on the west wall; and saints, singly or in pairs, at the west end of the *naos*. The mosaics are characterized by the use of the *style mignon*, mainly in the figures in the *dodekaorton* scenes of the elegant, beautiful, expressive prophets, reminiscent of ancient Greek sculptures, and in the vivid colors used in the decorative vegetal motifs, which bring to mind models of Hellenistic and early Christian art.

Previous Interventions

When the church was converted into a mosque in 1520–30, the mosaics were concealed beneath a thick layer of plaster (Demetriades 1985: 307–8). They were uncovered gradually during restoration work on the church conducted in 1926–28 (Xyngopoulos 1932: 133) and again in winter 1941–42 (Xyngopoulos 1953a). Large areas of the mosaic surface were found to have been destroyed by natural causes. It was also ascertained that almost all the gold tesserae had been removed from the mosaic background before the mosaics were plastered over, as evidenced by their imprints, most of which were still preserved in the setting bed, which had survived in a few places.

The mosaics were restored in 1952 by the artist and restorer Fotis Zachariou (Xyngopoulos 1953a). He filled in the

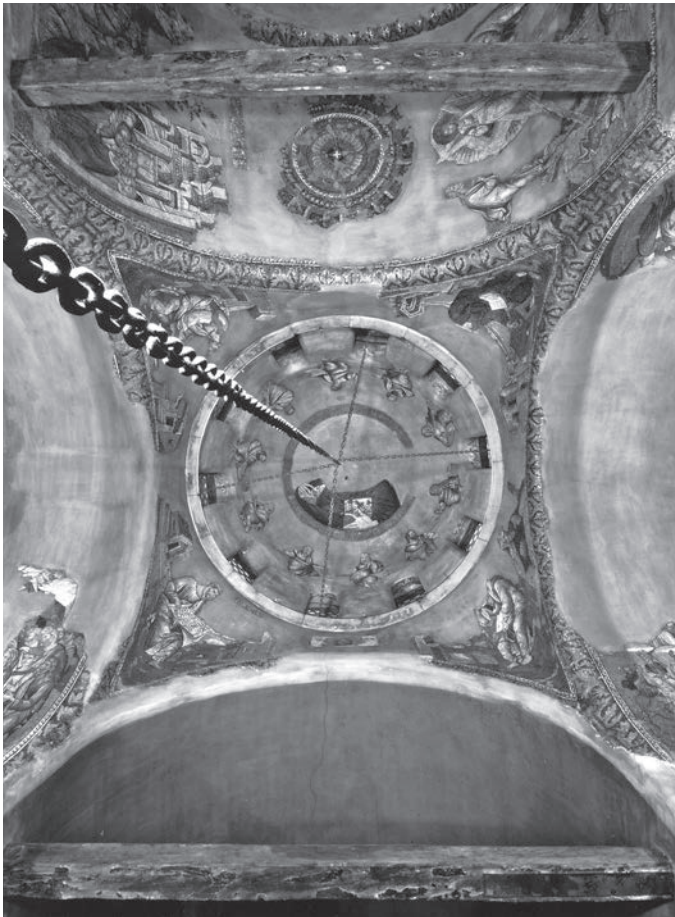


FIGURE 1 General view of the dome and the pendentives after maintenance treatment. Photo by C. Bakirtzis.



FIGURE 2 The west barrel vault after maintenance treatment. Photo by C. Bakirtzis.

areas of mosaic surface loss and covered the surviving mortar bed with a brownish red plaster; consolidated the detached mosaic surface with black cement, which he applied in the interstices between the tesserae and in some areas around the mosaic surfaces as an “edging”; and cleaned the mosaic surface and coated it with a specially made glossy varnish.¹

Current Investigations

Half a century later it was deemed necessary to examine the condition of the mosaics and improve their aesthetic appearance since they were covered by a thick layer of soot and grime. In fall 2002, with funding from the Third European Community Support Framework, the mosaics underwent preparatory cleaning. They were closely examined and their condition described, as were the visible results of the 1952

interventions. The aim was to detect, investigate, and interpret any related problems so that it could be decided whether the mosaics should undergo further conservation treatment and, if so, to what extent.

The main problems identified during the examination of the mosaics fifty years after they had been restored were the following: (1) partial detachment of the mortar bedding layers from the masonry; (2) partial detachment of the later “neutral” plaster layer from the masonry and the mortar bedding layers beneath it; (3) partial detachment of areas of the mosaic surface from the setting bed; (4) a network of hairline cracks penetrating both the setting bed and the neutral plaster; (5) superficial cracks and a few deeper ones that, like the hairline cracks, go through both the setting bed and the neutral plaster; (6) detachment of a large number of individual tesserae; and (7) deposits of grime and soot both on the mosaic



FIGURE 3 The Resurrection before the removal of grime and other deposits. Photo by C. Bakirtzis.

surface and on the neutral plaster (fig. 3). These are common problems with wall mosaics but difficult to resolve in this case because of the irreversible procedures undertaken in 1952.

The 1952 interventions stabilized the mosaics, but the choice of cement (owing to its durability and color) as a material for conserving and presenting mosaics and the use of plaster to fill in the areas of surface loss and cover the surviving parts of the mortar bed have created a situation that is technically and aesthetically difficult to reverse, and one in which both the original work and the previous treatments fall prey to the same causes of deterioration. Furthermore, the interventions have impaired the mosaics' aesthetic appearance: they filled the interstices and concealed the shape of the tesserae in some places, obscured their colors with the dull gray of the cement, and marooned the mosaic representations in a sea of neutral brownish red. There has thus been considerable debate about the most appropriate treatment method² for the consolidation of the mosaics and the possibility of taking any action regarding the neutral plaster. These two parts of the problem are physically interlinked, for any intervention that globally addresses one necessarily affects the other.

In a bureaucratic approach, this information would have been sufficient for the mosaics to be subjected to a new conservation intervention. However, the mosaics' condition—with only limited and slight detachment, grime, and fine cracking—did not justify another immediate in-depth retreatment. Furthermore, the brownish red areas are quite extensive and have, in the course of half a century, become an

established part of the mosaics' aesthetic appearance. Indeed, in some places the grime softens their stark outlines and creates convenient shadowy areas. Similarly, in other examples modern interventions have become an established part of a mosaic's aesthetic appearance (Ardovino 2005: 63–72; Maguire and Terry 2005: 101–9). To remove the extensive brownish red areas and expose the masonry would create new competing surfaces that would detract from the presence of the finely crafted mosaic representations. Given the chronological and economic planning of the project, together with the fact that the Holy Apostles is a functioning parish church, it was decided that the work done in 2004 would not go as far as a complete conservation treatment but would be limited to maintenance, with the principal aim of improving the mosaics' stability on the masonry and removing the grime and other deposits from the mosaic surface over a period of ten years.

Mosaic Maintenance Program

Improvement of the Mosaics' Stability

The question of consolidating the mosaics on the masonry aroused considerable concern because the usual method of in situ consolidation using grouting posed the dual risk of the neutral plaster either unifying with the mortar bed of the mosaics or solidifying on the masonry at those points where the mortar bed had been totally destroyed. Although in the current phase of the work the plaster would receive special care and attention, it was decided to avoid “binding” it to the monument, based on the belief that as a foreign body it might one day be removed due to the risk that should the monument fall during an earthquake it would take the mosaics with it. Additional reasons for not grouting with hydraulic mortar were (1) the tesserae are very densely laid, especially in the *dodekaorton* scenes, which meant that the grout would have to be injected only through the existing areas of damage on the mosaic surface; and (2) the grouting process involves considerable activity on the mosaic surface, as holes have to be bored and the grout almost invariably emerges onto the mosaic surface. The leaks are stopped up with clay, which presents an additional problem with regard to the cleaning and presentation of the mosaic. It was thus decided not to use grouting, but the following work was carried out.

- A small number of Plexiglas anchor rivets were inserted to improve the stability of the mortar bed on the masonry. This method had first been used in Thessaloniki to consolidate the mosaics in the



FIGURE 4 Stabilization of the mortar bedding on the masonry with Plexiglas anchor rivets. Photo by C. Bakirtzis.

east barrel vault in the Church of Hagia Sophia (Kanonides and Mastora 2003: 408–9). In the case of the dome mosaics in the Church of the Holy Apostles, the anchor rivets were inserted around the figures into the neutral plaster and into the underlying mortar bed (fig. 4). In the *dodekaorton* scenes, which survive more extensively, the rivets were inserted primarily into existing areas of damage of the mosaic surface.

- In very small areas of the mosaic, where the setting bed was badly destabilized and the mosaic surface detached, grouting was carried out with Primal® acrylic emulsion (40 percent v/v in water).
- To fix the tesserae surrounding the damaged areas more securely, the decayed neutral plaster applied

during the 1952 intervention was replaced with lime plaster of the same shade.

- Great attention was devoted to re-adhering individual detached tesserae, which frequently came away at a touch owing to the network of fine cracks and the tiny crevices in the setting bed beneath them as well as the weakening of their adhesion to it. Detachment and loss of individual tesserae has always been a problem, for the lime plaster that covered the mosaics during the Ottoman period has been found in blemishes caused by loss of individual tesserae. Furthermore, a comparative study of the mosaics' present condition and photographs taken after the 1952 restoration confirms that detachment of the tesserae is a chronic rather than a new or occasional problem. The detached tesserae were affixed to their own imprints in the setting bed with Primal® (40 percent v/v in water).

Removal of Grime and Other Deposits from the Mosaic Surface

The mosaic surface was cleaned of its heavy layer of grime and soot by the simple expedient of removing the varnish applied during the 1952 restoration (figs. 3, 5). The varnish was a thickly laid mixture of wax and caseine, which had absorbed the soot and grime, preventing both from penetrating the interstices. It was solubilized with acetone, applied with soft brushes and, as soon as the varnish had dissolved, removed with a sponge soaked in deionized water. The clean surface was then immediately dried with an absorbent cloth. The removal of the varnish revealed the bright, vivid colors of the tesserae without the need to use large quantities of water or mild chemicals to clean the mosaic (fig. 6). No cleaning was done where white stone and colorless glass tesserae were observed to have been painted with green color in the background of the representations of single saints at the west end of the *naos*, so as not to remove this interesting structural finishing feature of the mosaics.

Superficial mechanical cleaning was carried out using a scalpel and dentistry tools to remove, mainly from the surface of the tesserae, remnants of the plaster applied in the Ottoman period that had not been completely removed in 1952, as well as other plaster remnants that had covered the mosaic surface when major and minor damage was restored in 1952. Very little pressure was applied in removing the foreign materials from the interstices for fear of detaching even more individual tesserae. After cleaning, the mosaic surface was finely sprayed with a colorless matt solution (Paraloid® B72, 2–4 percent v/v in acetone), not to enhance the lus-



FIGURE 5 The Resurrection after cleaning. Photo by C. Bakirtzis.



FIGURE 6 Detail of the prophet Elias during cleaning. Photo by C. Bakirtzis.



FIGURE 7 Trial cleaning of the neutral plaster (dome, prophet Isaiah). Photo by C. Bakirtzis.

ter of the mosaic surface—which is not necessary—but to protect the mosaics from deposits, based on lessons learned from 1952.

“Neutral” Plaster

The appearance of the plaster was improved by dry and wet cleaning, which removed the deposits of grime and soot and revealed faint shadows corresponding to the underlying mate-

rials (fig. 7). These mitigated the undifferentiated appearance of the void and enhanced its neutrality (fig. 8). Cracks and blemishes in the plaster were selectively filled in with plaster of the same shade. No other improvements were made (such as renewing the color or attending to the network of fine cracks) so as not to cursorily conceal the associated problems and so that the plaster too would show the effects of time, which, in its mute monotony, serves the superb art of the Holy Apostles mosaics.

Current Maintenance Plan

The current maintenance plan includes the following:

- ensuring the appropriate conditions for the proper maintenance of the mosaics: monitoring of temperature and humidity, regular ventilation of the monument, control of watertightness of roofs and windows, and protection of mosaics from exposure to artificial light; and
- reinspecting the condition of the mosaics’ maintenance at regular intervals, on the basis of the detailed documentation of both the mosaics’ and the neutral plaster’s condition compiled during the recent maintenance treatments; such inspections will consist of the frequent monitoring of the reattached tesserae by touch.



FIGURE 8 Detail of the Dormition of the Virgin after maintenance treatment of the mosaic and the neutral plaster. Photo by C. Bakirtzis.

Conclusion

The knowledge gained from the recent maintenance treatment of the Holy Apostles mosaics may be summed up as follows:

- The large-scale interventions performed in the past, which were acceptable at that time in the framework of total consolidation and restoration, ensured the mosaics' stability. However, they created a situation that constrained subsequent interventions while also affecting the mosaics' aesthetic appearance. Any new intervention must first address the problems of the earlier conservation, and it is thus clear that there are no total, definitive solutions for conserving and maintaining mosaics (Russell 2004: 35).

- Because individual tesserae had become detached, the stability of the tesserae needs to be monitored by touch at regular intervals.
- It was ascertained that covering the mosaic surface with varnish has a protective effect, as it collects grime and soot, preventing them from settling directly on the surface and making it possible to clean easily without mechanical or chemical means.

On completion of the work the mosaics' appearance was greatly improved without being dramatically changed, and their attachment to the masonry was strengthened. Furthermore, the new panes of absorbent, honey-colored glass that were fitted in the existing window frames in the dome and in the tympana of the arms of the cross have enhanced the spiritual aspect of this superb Byzantine church and show that where mosaics are concerned there is no substitute for natural light.

Notes

- 1 Stavros Baltoyannis, a colleague of Fotis Zachariou, informed us that the varnish was a secret recipe devised by Zachariou himself, though he believes it was a mixture of wax and casein.
- 2 We want to thank Francesca Piqué, formerly of the GCI, for defining the term *treatment* in English. It must be pointed out, however, that the English term does not encompass the constant maintenance that mosaics in Greece receive from the Archaeological Service in accordance with the letter and the spirit of the Archaeological Law (No. 3028/2002).

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Discussion—Session 1: Evaluating Mosaic Practice

Président/Chair: Demetrios Michaelides

Discussion following Martha Demas Presentation

NICHOLAS STANLEY-PRICE: I would first like to thank all the speakers this morning for an exceptionally interesting series of talks. I have some comments and then questions in terms of the Orpheus project, and I thank Martha Demas very much for a wonderfully self-critical account of the project. A comment when talking about the cost of conservation: hidden in the appendixes of the Orpheus report are the costs at least of the equipment and materials, which were included especially because the rolling technique was likely to raise some questions about costs involved. My question concerns dissemination of information. The dissemination of all this work that we do and publish through the papers of this committee and through other means—and this also concerns the other paper by Francesca Piqué—how do we know how well this will be distributed? For instance, if you search for literature, or in library catalogs around the world, are you able to get some idea as to whether these publications reach, on the one hand, the large libraries of the world, universities, and, on the other, the large international citation databases?

MARTHA DEMAS: As you know, there are many ways of searching to discover the answer to that question. We did in fact look at where the Orpheus publication was in libraries around the world and found that it was in very few of them. We also did literature and citation searches that show you where the book is being cited and how often it's being cited. And that was the basis on which we judged whether it had some sort of impact within the conservation literature. As I mentioned, it was very poor. So, at one level, it seems like the publication is not getting into libraries. Obviously, we cannot track what is getting

into individual hands. We can track our own publications and know how many copies are sold, but we don't really know where they're going.

FRANCESCA PIQUÉ: That's a very interesting question, and I must say that the searches we did were not aimed at determining dissemination of information. But, just a comment, we felt that the fact that you could retrieve online so many records is an incredible improvement in disseminating information, and it's also extremely helpful to have keywords and abstracts in these reference collections. On the other hand, once you determine the reference that's interesting, and you want to look at it in detail, it's not easy to find. For instance, I was trying to find ICCM publications in Florence. These were available only at the Opificio delle Pietre Dure library, which, because of lack of personnel, cannot provide public access. So I had to travel to Rome to ICCROM's library for these. Just as an example, then, even in a country like Italy, it was rather difficult to find some of the most basic literature.

AMR NAWAR AL MUAYYAD AL-AZM: I'd like to thank Martha for a wonderful presentation. I have a query. I noticed that you used Aerolam® to place the mosaic on, and considering its cost, what was the reason for that? I can see it used in a museum, but I was a bit surprised, considering the mosaic would be put back in its place anyway, laid on a concrete surface. Why not just use an isolating layer and unroll the mosaic on it?

MARTHA DEMAS: The reason for the use of Aerolam® was that it would be a good isolating barrier, it was lightweight, and it would allow the mosaic to be lifted, as you saw, with the crane. The whole project was expensive; it wasn't just the Aerolam® panel. I think they saw it as the best way to isolate the mosaic

and also make it portable so that it could be transported back and relaid in situ.

PATRICK BLANC: Oui, je voulais juste avoir une précision sur le problème de l'entretien. Est-ce que vous avez pu définir pourquoi l'entretien n'a pas fonctionné après votre intervention? Parce que c'est un problème très important que l'on rencontre tous.

MARTHA DEMAS: This is probably a better question for Demetrios, but I'll give it a try. I think it didn't take place for a number of reasons. One is that this mosaic was situated in a gray zone—it wasn't quite open to the public, but it was accessible to the public—and so it didn't get the same level of maintenance as the rest of the site. I think it was also due to the fact that nobody was given the particular responsibility to maintain and monitor the site on a regular basis. And that goes back to my point about effective management. The management structure was really not there to make these things happen, and that's the reason they didn't.

DEMETRIOS MICHAELIDES: I am the person responsible, so I will also answer the question. Maintenance is one of the weakest points of the Department of Antiquities. The Orpheus mosaic and shelter are not the only victims, just very obvious because the structure is separate from the rest. Also, we have to bear in mind that the shelter was built to be temporary, with a life span of three or four years, and replaced by a permanent shelter. This was in the 1980s; we are now in 2005, and it's still a temporary shelter that is waiting to be replaced and that is not maintained. All the same, it's not an excuse; it should have been replaced because it is becoming a safety matter.

AÏCHA BEN ABED: Dans le cas de la mosaïque d'Orphée, considérant l'effort et le coût qui, si mes souvenirs sont bons, furent très élevés pour cette opération, sachant qu'il n'y avait pas de suivi, qu'il n'y allait pas avoir d'entretien et de véritable gestion de la mise en valeur de cette mosaïque et de la dépose, pensez-vous que cela valait la peine de faire ce projet ?

MARTHA DEMAS: One of my main conclusions is that we were not really thinking in that direction. It was an intervention to resolve a particular problem of the mosaic, one mosaic, and we were not thinking holistically. The project wasn't conceived holistically. And on the other side of it, there was not a vision by [site] management to think holistically either, so the groundwork wasn't there for it to have been an effective, integrated outcome.

General Discussion

HASSAN LIMANE: Ce n'est pas une question mais plutôt une invitation à une réflexion à travers deux exemples qui nous ont été présentés ce matin, et surtout en ce qui concerne les couvertures des espaces mosaïqués. Nous avons vu deux exemples, celui d'une toiture légère qui n'a pas été maintenue et celui d'une toiture solide, l'exemple d'Alexandrie. Ce sont deux cas isolés, c'est intéressant. Il est tentant de couvrir les mosaïques parce que ça contribue au travail du restaurateur et ça permet de donner une certaine durée à la conservation, mais lorsqu'on a l'espace d'une ville toute entière, avec à peu près soixante ou soixante-dix mosaïques, la couverture ne pose-t-elle pas un problème et quels choix doit-on faire ?

JAROSŁAW DOBROWOLSKI: I guess the question is for me. I think it's a question of the general presentation program for the site. We have a huge site at Alexandria, and mosaics are just a part of what is to be seen there. I have to be specific about our contribution to this whole proposal. I think it was a very valuable and viable project because it enriched the presentation of the site as a whole with a completely new component, with a modern component. But preservation of certain mosaics on a much larger scale on-site was not to be considered. This site is a concession of the Polish Center, and it is responsible for the overall problem of conservation, together with the Supreme Council of Antiquities. So, yes, this project was, in a sense, isolated, but it was never meant to be anything else.

DENIS WEIDMANN: Le problème avec les abris, sans entrer dans le débat général sur les abris qui sera, je pense, ouvert ces prochains jours, est qu'il faut trouver ici une limite de la gestion de l'abri lui-même. Nous avons vu à Paphos, un abri léger c'est une illusion, du moins pour quelques années. Dans nos climats du Nord des Alpes, les abris peuvent être lourds, c'est de la construction traditionnelle, mais la limite est plutôt trouvée dans la possibilité future de gérer et d'entretenir ses propres abris. L'abri ne doit également pas devenir une machine à détruire la mosaïque, c'est un phénomène que l'on trouve très souvent. On part d'une bonne intention, mais après, par effet architectural, par effet constructif ou par effet de pollution, on s'aperçoit que l'on a accéléré la destruction. C'est plutôt une question de collaboration entre les architectes et les conservateurs.

FEDERICO GUIDOBALDI: This is a question that can be directed to more than one of this morning's speakers. When I see a mosaic before the *dépose*, I don't directly see the reasons for removing it. When we see the Orpheus mosaic for the first time in its

original situation, or other mosaics for which the archaeological context and what exists below remain, and how lifting destroys the mosaics, I ask myself if it's not better to leave them in the soil. It is important, I think, in the conference recommendations to advocate in situ conservation and to study the mosaics better, because they are not studied very well.

Discussion following Charalambos Bakirtzis Presentation

FRANCESCA PIQUÉ: The meaning of *maintenance* is not always clear or consistently used by the profession. Could you define what you mean by maintenance in Greece?

CHARALAMBOS BAKIRTZIS: *Maintenance* is not a Greek term. We used to say, as you've seen in the proceedings of the Thessaloniki congress, that maintenance is translated as διατήρησις (*diaterese*). But this is actually the word for "preser-

vation." So maintenance does not have a specific Greek translation. Anyway, we use maintenance to speak about repairs, to speak about care.

ROBERTO NARDI: A simple comment on this paper. Part of it is a few small, technical details that I would be interested in discussing in more depth. It was extremely interesting to see an attitude applied that is based on actions implemented according to cautious and careful decisions. This is not the result of technical decisions taken six months ago; this is obviously the result of a long process, a long political process that started years and years ago. I am not involved with this [project], but I imagine this [was the case], because if we compare similar interventions carried out in similar regions, the decisions are very different. This demonstrates the fact that technical decisions, even the best technical decisions, need strong political support that has to be initiated far in advance. So I was very pleased and impressed by your work.