ALLEGATO A

UNIVERSITÀ DEGLI STUDI DI MILANO
Procedura di valutazione per la chiamata a professore di I fascia da ricoprire ai sensi dell'art. 24, comma 6, della Legge n. 240/2010 per il settore concorsuale 07/I1 – Microbiologia Agraria,
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Francesca Cappitelli
CURRICULUM VITAE

INFORMAZIONI PERSONALI

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DATA DI NASCITA	15/11/1971

INDIRIZZO: DIPARTIMENTO DI SCIENZE PER GLI ALIMENTI, LA NUTRIZIONE E L'AMBIENTE - UNIVERSITÀ DEGLI STUDI DI MILANO, VIA CELORIA, 2, 20133 MILANO
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Francesca Cappitelli
CURRICULUM VITAE

1. NATIONAL SCIENTIFIC QUALIFICATIONS

* Qualification for the position of Full Professor (*Professore di I Fascia*) Settore Concorsuale 07/I1 – Microbiologia Agraria conferred on 28 March 2017.

Overall evaluation: excellent.

* Qualification for the position of Associate Professor (*Professore di II Fascia*) Settore Concorsuale 07/I1 – Microbiologia Agraria conferred on 8 January 2014.

Overall evaluation: excellent.

2. UNIVERSITY EDUCATION, QUALIFICATIONS AND APPOINTMENTS

2.1 University education and qualifications

September 1998 - April 2002	PhD awarded at the Royal College of Art, London. Thesis title: "The chemical characterisation of binding media in 20th century art". UK PhD recognised as equivalent to the Italian doctorate on 3 April 2003
10 December 2002	*Cultore della materia*, AGR/16, Università degli Studi di Milano
23 September 1998	Association of Food Technologists, Food Technologist qualification
October 1990 - July 1996	Laurea in *Scienze delle Preparazioni Alimentari* (Food Science) awarded at the Università degli Studi di Milano, mark 110/110 cum laude, conferred on July 10, 1996. Thesis title: "*Indagini microbiologiche, calorimetriche e molecolari per l'identificazione e lo studio di microrganismi deteriogeni dei manufatti artistici*"

2.2 Academic appointments

March 1, 2015-present	Associate Professor of Agricultural Microbiology, Università degli Studi di Milano
1 February 2006 – 28 February 2015	*Ricercatore Universitario* (tenured researcher) of Agricultural Microbiology, Università degli Studi di Milano (*conferma* on 1 February 2009)
3 June 2003 - 31 January 2006	MIUR Brain Gain Programme Fellow, Università degli Studi di Milano, Department of Food Science and Microbiology. Research interests: investigation of bioremediation of deteriorated cultural heritage
1 March 2003 - 2 June 2003	Post-doc Research Fellow, Università degli Studi di Milano, Department of Food Science and Microbiology. Research interests: investigation of bioremediation of deteriorated cultural heritage

2.3 Work experience in museums

9-21 May 2002	Vienna University of Technology, Institute for Chemical Technology and Analytics, Analytical Chemistry Division and Kunsthistorisches Museum, Vienna, Austria. Duties: THM-GCMS lectures and practice
1 December 1998 - 1 November 2001	Victoria & Albert Museum (London), Conservation Department. Occasional Professional Assistant (Conservation) agreement. Duties: Research on modern materials
1 July 1997 - 30 June 1998	Museo del Collezionista d'Arte (Milan), Scientific Laboratory. Duties: wood dating research using infrared spectroscopy

2.4 Internships

December 1999	Università degli Studi di Torino, Department of Chemistry IPM (Prof. O. Chiantore). Technique employed thermally assisted hydrolysis and methylation / gas chromatography - mass spectrometry (THM-GCMS)
May 1999	FOM Institute for Atomic and Molecular Physics (Amsterdam), AMOLF (Dr. K. van den Berg). Technique employed: direct temperature-resolved mass spectrometry
September 1996 - June 1997	Università degli Studi di Milano, Department of Food Science and Microbiology (Prof. C. Sorlini). Duties: investigation of biodeteriorated cultural heritage

3. RESEARCH ACTIVITIES

3.1 Research areas of interests (Numbers in parentheses refer to section 4.2)

1) Cultural heritage biodeterioration

Many scientific disciplines contribute to cultural heritage knowledge and conservation, including microbiology (**19**). Areas of cultural heritage microbiological research include the study of biodeterioration of inorganic materials (e.g. stone and frescoes, **62**) and organic materials, e.g. paper, parchment, paintings and synthetic polymers (**10, 34, 64**), the effects of pollution (**55**) and innovative methods for control (**70**). Additionally, biochemical protocols were devised to quantify protein binders in paintings (**71**).

In order to get a better understanding of the correlation between damage location and microbial communities on site, some techniques and protocols related to geographical repartition of different biodeteriogen taxa and their in-situ visualization were optimised (**21**, **25**).

Microbial colonization on stone, mortar and fresco surfaces is of crucial importance for the preservation of material integrity and the aesthetic appearance of monuments and historic buildings. Phototrophs, like algae and cyanobacteria, are pioneer microorganisms able to readily colonize outdoor and indoor surfaces and develop biofilms, which, in turn, causes aesthetic, chemical and physical decay (**22**, **32**, **57**). Biodeterioration can affect a building or object at an early stage of its construction. For example, soon after the National Museum of the American Indian Building (NMAI), Washington, was completed in 2004, some areas of the external stone surface were covered by black staining, putatively attributed by conservators to microbial growth. The origin of the black staining on the NMAI building was not chemical but microbiological in nature; the discolouration was ascribed to the presence of the cyanobacterial sheath yellow-brown pigment scytonemin (**39**).

Libraries, archives and museums preserve documents, and such materials are at risk of deterioration and need to be protected from physico-chemical and biological agents (**23**). In many cases, microbial processes have been implicated in their deterioration (**8, 30, 67**) and methods should be devised to prevent the microbial attack (**12**). In all cases, molecular studies are fundamental to the assessment of the current microbiological risk to the documents. For example, after a visual inspection of the Leonardo da Vinci's Atlantic Codex by a scholar, active molds were reported to have been present on Codex pages showing areas of staining. The coupling of non-invasive membrane sampling with a molecular-based microbial community analysis led to the conclusion that there was no relationship between the presence of an active microbial community and discoloration (**31**). In addition, indoor air quality assessment is crucial for evaluating the cultural heritage repository suitability (**50, 77**). Human health and safety concerns and possible effects of biocidal treatments on collection materials have resulted in the search for non-chemical alternatives to treat documents. A technology in the field of document conservation is plasma treatment, a process that has been proved successful and safe for the operator of the equipment and the environment (**7**).

With advancements in materials science over the past century, there has been a dramatic increase in the use of synthetic polymers by both artists and conservators. Like natural materials, synthetic polymers are subject to biodeterioration (**6**, **20, 74**), the extent of which depends on the resin, e.g. acrylics are less susceptible than poly(vinyl acetates) that in turn are less susceptible than

alkyds (**9**). Polymer-based contemporary art objects can suffer microbial deterioration and the ski-cabin Futuro (1965), consisting of glassfibre-reinforced polyester filled with polyester-polyurethane foam and Perspex, extensively attacked by cyanobacteria and Archaea, is just one example (**15**). Also, once chemically and physically degraded, synthetic polymers used in conservation treatment have been found to be a nutritional source for black fungi, as in the case of Milan cathedral in the past treated with acrylics (**16**, **17**).

2) Charaterisation and use of microorganisms for the remediation and recovery of polluted sites and surfaces

Recent advancements in biotechnology show the fundamental role of microbial communities as catalysts of numerous processes and the advantages of using microbes to provide 'services' to human beings. Microorganisms are the major players in the recycling of elements and are increasingly used in the bioremediation of waste materials and polluted environments (**24**, **29, 45**), and in bioweathering in different artificial and natural ecosystems, e.g. for soil fertility and plant growth promotion (**38**).

Microorganisms are generally associated with detrimental effects on artistic materials (**1**, **2**). However, they can also be used for the removal of harmful compounds on cultural heritage objects such as organic matter, nitrates and sulphates (**5**, **14**, **36**). The biocleaning of altered surfaces has some advantages over traditional cleaning methods; chemicals are not always selective and mechanical treatments can sometimes damage the surface (**18**). In addition, the biological method is non-invasive and represents an environmentally-friendly alternative as microorganisms act in the same way as they do in their natural environments. Biocleaning has been proved successful on marble and limestone (**27**), and also when heavy metals are present (**13**). Recently, a study has evaluated the most appropriate cleaning treatment for black crust removal, adopting chemical, laser, and microbial cleaning for the removal of black crusts (**33**). Overall, the most satisfactory treatment was the microbial cleaning process. It was the most controllable process and the most efficient for sulfate removal. Its main drawback appeared to be the time needed to remove thick black crusts since numerous applications were necessary. To address the time challenge, the effects of a sulphate-reducing bacterium strain coupled with a non-ionic detergent pre-treatment was studied on a one-century-old artistic marble affected by black crusts (**48**). Compared to the biocleaning alone, the co-treatment needed fewer biological applications and resulted in a 70% reduction in total cleaning time, but still retaining all the advantages of the biocleaning approach. Biocleaning has been used for the Cathedrals of Milan, Florence, and Matera, the base of Michelangelo's Pietà Rondanini in Milan; three sculptures in the Buonconsiglio Castle courtyard in Trento and the Monumental Cemetery in Milan. Biocleaned frescoes include a detached wall painting at the Monumental Cemetery in Pisa.

Until the 19th century, paints contained only natural binders (**47**). In contrast, 20th and 21st centuries paints, including spray paints used for graffiti, often contain synthetic polymers (**3**, **4**, **11, 73**). Current methods for the removal of graffiti include chemical and physical (including laser) approaches. Bioremediation has a great potential as a novel approach to graffiti removal (**54**). Microorganisms have been proposed for the removal of synthetic polymers used as conservation materials and in paints from cultural heritage surfaces, e.g. nitrocellulose (**53**). So far only one published study has focused on bioremediation of graffiti spray paint, proposing *Desulfovibrio desulfuricans* ATCC 13541 as a good candidate for the degradation of nitrocellulose (**41**).

3) Biofilm studies

Multiple species biofilms allow to study the interactions among sessile microorganisms. A laboratory model of a mixed-species biofilm at the stone/air interface was developed to evaluate the interplays between a phototroph and a heterotroph (**60**).

Despite the appreciation of the role played by outdoor stone heritage, research efforts have not been completely successful in tackling the complex issues related to its conservation. To this end, the necessity of approaching the topic from an ecological perspective through an overview of the characteristics of biofilms that mediate different ecological interactions (**63**), type of stone employed (**79**), secondary bioreceptivity (**81**) and the effects of surface colour (**84**) was studied.

Biofilm cells can tolerate much higher concentrations of biocides than their planktonic counterpart. Given the many environmental applications of TiO_2, it seemed appropriate to determine whether surface immobilized TiO_2 could become an alternative control technology to

counteract sessile microorganisms. The TiO_2 nanopowder produced 1-log reduction of *Pseudomonas aeruginosa* planktonic cells in 2 h and TiO_2 thin film produced almost a complete eradication of *P. aeruginosa* planktonic cells in 24 h. In contrast, neither the photocatalytic treatment with TiO_2 film nor TiO_2 nanopowder had any effect on *P. aeruginosa* biofilms (**37**).
Silver nanoparticles (Ag-NPs) are widely used for medical and industrial applications, e.g. for biological implants, air and water treatment filters, clothing, paints, cosmetics and food storage containers. *E. coli* and *B. subtilis* reacted differently from AgNPs over a wide range of sublethal concentrations examined under both aerobic and anaerobic conditions (**65**). At low concentrations, Ag-NPs killed *Azotobacter vinelandii* and affected cellular processes in planktonic and sessile *B. subtilis* cells. Re-direction of gene expression, linked to selective toxicity, suggested a strong impact of Ag-NPs on soil bacterial communities (**56**).The effects of sub-lethal concentrations of silver nanoparticles were also tested on a simulated intestinal prokaryotic-eukaryotic interface (**75**). In addition, the impacts of dietary silver nanoparticles and probiotic administration on the microbiota of an in-vitro gut model were investigated (**83**).
Although a complex and fragmentary picture results from current knowledge of the pathways activated in response to oxidative stress, three main responses were shown to be central: the existence of common regulators, the production of extracellular polymeric substances, and biofilm heterogeneity (**61**). Biocides can lead to cellular constituents being subjected to enhanced reactive oxygen species (ROS) levels. For example**,** perturbations of the physiological steady-state level of ROS affected biofilm genesis and the characteristics of the model bacterium *A. vinelandii*, promoting the transition from a planktonic to a sessile phenotype (**42**).
Although the inclination to colonize surfaces is advantageous from the microbial standpoint, it may cause biodeterioration of artistic objects (**43**) and engineered systems (**52**), and fouling in food-processing equipment (**51**). Indeed, the presence of detrimental sessile bacteria on food processing surfaces may lead to: transmission of diseases, food spoilage, shortened time between cleaning, reduced heat transfer efficacy or even equipment obstruction, metal corrosion in pipelines and tanks resulting at least in metal loss, and contamination of product by nonstarter bacteria (e.g. cheese by nonstarter lactic acid bacteria). Despite the significant problems caused by biofilms in the food industry, biofilm formation in these environments is still poorly understood and effective control of biofilms remains challenging (**51**).

4) Environmentally friendly anti-biofilm strategies

Testing sub-lethal concentrations of compounds from plants is critical to acting on mechanisms subtler than the killing activity, e.g. those influencing the multicellular behaviour, offering an elegant way to develop novel antimicrobial-free antibiofilm strategies. In the past, the plant-biologically-active low-molecular-weight compounds were screened mainly for their lethal effects, disregarding concentrations and ecologically relevant functions of these molecules in the natural context. Recent successes of the use of sub-lethal concentrations of plant-derived compounds, their ecological insight, pros and cons, future directions and impacts, have been illustrated (**46**). The bulb extract of *Muscari comosum* caused more than 98% reduction in *Candida albicans* coverage on abiotic surfaces, without killing the planktonic cells (**44**). In addition, when added to *C. albicans* biofilm, the natural extract was shown to induce the dispersion of sessile cells in a dose-dependent manner. The formation and promoting the dispersion of biofilms was carried out with non-lethal effects of seagrass extracts (**78**).
Moreover, although advances in organic synthesis have extended the lifetime of classical antibiotics through synthetic modifications, the search of innovative antibiofilm compounds from natural sources can provide new templates, novel targets and unique mechanisms that could have advantages over known antimicrobial agents (**49**).
Zosteric acid (ZA) from the eelgrass *Zostera marina* represents an antibiofilm agent able to significantly reduce, at sublethal concentrations, both bacterial and fungal adhesion, and biofilm biomass and thickness, and to extend the performance of antimicrobial agents (**28**, **35**). IN addition, zosteric acid shows cytocompatibility towards soft and hard tissue (**28**, **35**). Membrane-based separation processes are becoming the promising technology in wastewater treatment as well as in drinking water and high purity water production and purification in biorefining and bioenergy processes. To guarantee minimal biofilm coverage on membrane surface for extended time, the use of zosteric acid anchored to the surface was proposed (**52**). Zosteric acid treatment

induced a migration activity of the membrane-isolated flagellated *P. putida*. By studying the altered expression level of *Escherichia coli* proteins in response to treatment with zosteric acid, the ability of zosteric acid treatment to induce a hyper-motile phenotype in *E. coli* was also reported (**40**). Functionalisation of the wastewater membrane surface was recommended, as other methods (such as dispersion or blending into or spraying onto a coating) may not be successful (**26**). As mechanism of action, ZA was proved to interact with the *E. coli* NADH:quinone reductase WrbA, suggesting a possible role of this protein in the biofilm formation process (**59**).
Salicylic acid (SA) is a secondary metabolite widely distributed throughout the plant kingdom. It is involved in several physiological processes including the regulation of seed germination, stomatal closure, ion uptake through roots, the stimulation of flowering, response to abiotic stresses and it is a signal molecule involved in the sophisticated ecological strategy that plants have adaptively developed to prevent harmful bacterial colonization. The study of the response of *E. coli* biofilm (considered as a prokaryotic sessile model) to salicylic acid was therefore important (**68**).
Recent progress in bio-inspired biofilm-resistant polymeric surfaces was widely reviewed (**80**). In this context, zosteric acid and salicylic acid bound to a low density polyethylene surface were proved to successfully control bacterial biofilm formation (**72**, **76**).
As not only bacteria and yeasts but also filamentous fungi form biofilms, fungal targets for the development of novel non-lethal strategies in plant disease management were proposed (**69**). In this respect, sub-lethal concentrations of *Perilla frutescens* essential oils affected phytopathogenic fungal biofilms (**85**).
Also enzymes can be used as environmentally friendly antibiofilm agents. Immobilized hydrolytic enzymes were proved to exhibit antibiofilm activity against *E. coli* at sub-lethal concentrations (**58**). Coating polypropylene surfaces with protease weakened the adhesion and increases the dispersion of *Candida albicans* cells (**66**). In **82,** α-chymotrypsin immobilised on a low density polyethylene surface was proved to successfully weaken *E. coli* biofilm formation.

3.2 Invited scholar

14-17 April 2010	Museum Conservation Institute (MCI), Smithsonian Institution, Washington D.C., USA Invited expert in Cultural Heritage Microbiology, meeting of some EU experts of stone microbial deterioration

3.3 Funded national and international research projects
3.3.1 Role of coordinator/principal investigator/expert

Duration	*Title*	*Funding body*	*Role*	*Total grant of the project (euros)*	*Research unit grant (euros)*
June 2016-May 2018	German-Italian bilateral project "Bioactive secondary compounds from halophyte species inhibit biofilm formation of plant-pathogenic microorganisms on plant surfaces" (SAB-HAL)	MIUR-DAAD Joint Mobility Program	principal investigator of the Italian unit	16,454 + unknown amount for the German unit	**16,454**
April 2016-June 2016	Programma di ricerca concernente lo studio dei biodeteriogeni presenti su alcuni	Parrocchia di San Giovanni Battista, Monza, Italy	person in charge	6,000	**6,000**

	litotipi del Duomo di Monza				
April-September 2015	“Sistematizzazione delle conoscenze e studi tematici per l'individuazione di buone pratiche per la conservazione di tipologie di Beni a rischio: pavimentazioni antiche e strutture in terra cruda" - "indagini e tecniche diagnostiche in ambito biologico nell'ambito del P.O. FESR Sicilia 2007/2013 Asse III - Obiettivo Operativo 3.1.1. - Linea d'intervento 3.1.1.4. DDS n.998 del 16.05.2012 e successivo D.D.G. n.2727 del 23/09/2013. Cod. Progetto SI 1 9731.”	Centro Regionale per la Progettazione e il Restauro, Regione Sicila	coordinator of two research units	28,999	**8,789**
December 2014-April 2017	“Unraveling Mechanisms of Bio-deterioration of Stones in Historical sites: Methodologies for Preserving Cultural Heritage”	Italian Ministry of Foreign Affairs and Ministry of Science Technology and Space of the State of Israel	principal investigator of the Italian unit	131,000 + unknown amount for the Israeli unit	**131,000**
April 2014 - March 2016	"NanoGut - Unraveling the effects of food-related engineered NANOparticles on the GUT interactive ecosystem"	CARIPLO Foundation	coordinator of two units	268,000	**137,000**
August 2013 - July 2016	FP7-PEOPLE Marie Curie IOF grant "Environmental sensory perception in cyanobacterial biofilms: understanding biodeterioration of outdoor stone materials in a changing environment" - ESENCYA	EU	in-going host institution person in charge	261,627	**261,627**

December 2013	"Analisi dell'efficacia didattica della piattaforma Quaestio"	initiativa s.r.l. (SME)	expert	3,660	**3,660**
March 2012 - February 2014	"Novel materials for medical devices based on biofunctionalized surfaces with antifouling properties"	CARIPLO Foundation	coordinator of two units	433,000	**170,000**
January 2012- December 2013	German-Italian bilateral Vigoni project "Seagrass compounds inhibit biofilm formation - from the identification to the application"	German DAAD and Italian CRUI	principal investigator of the Italian unit	13,000	**3,000**
October 2010 - April 2012	"Nuove tecnologie antifouling non tossiche per sistemi di filtrazione a membrana caratteristici di impianti di depurazione dell'area trentina"	Fondazione Cassa di Risparmio di Trento e Rovereto	person in charge of scientific supervision	36,000	**36,000**
March 2010 - September 2012	PRIN project 2008 "Proteomic and immunochemical protocols to study proteins in oxalate patinas and painted objects"	MIUR	coordinator of three units	93,342	**40,330**
June - August 2008	"Comunità batterica presente sulle pagine del Codice Atlantico di Leonardo da Vinci"	Veneranda Biblioteca Ambrosiana	expert	4,000	**4,000**
June 2008 - December 2009	Three research contracts "Studio della microflora presente nell'acqua di falda depurata tramite biorisanamento microbico"	URS Italia spa (SME)	person in charge	26,400	**26,400**
November 2008- October 2009	PUR project 2008 "Ottimizzazione di processi biologici per il trattamento di fanghi di supero dalla depurazione delle acque e per lo smaltimento di scarti dell'industria alimentare con recupero energetico"	Università degli Studi di Milano	coordinator	18,406	**18,406**

March 2007-July 2008	"Attività di ricerca e trasferimento tecnologico sull'impiego di microrganismi nel settore del risanamento dei beni culturali e di manufatti artistici"	Metapontum Agrobios Soc.Consort. A R.L. (SME)	person in charge	114,000	**114,000**
November 2006-October 2007	FIRST project 2006 "Biodeterioramento di materiali sintetici in opere d'arte contemporanea e biorimozione di protettivi su monumenti"	Università degli Studi di Milano	coordinator	4,160	**4,160**
June 2003 - January 2006	"Recupero di manufatti lapidei alterati mediante l'uso di microrganismi"	MIUR Brain Gain Programme	coordinator	126,000	**126,000**
Total				1,584,048 + unknown amount	**1,106,826**

3.3.2 Role of investigator

Duration	*Title*	*Funding body*
April 2018-April 2020	"VOLAC - Valorization of OLive oil wastes for sustainable production of biocide-free Antibiofilm Compounds"	CARIPLO Foundation
February 2012 - January 2014	"Valutazione della tossicità ambientale indotta da nanoparticelle: focus su batteri del suolo, alghe unicellulari e piante superiori"	Fondazione Banca del Monte di Lombardia
December 2010 - December 2012	"Tecnologie integrate per le documentazione e la valorizzazione dei beni culturali lombardi"	Regione Lombardia
January 2010 - June 2011	"Il cortile del Richini (Università degli Studi di Milano, Via Festa del Perdono)"	CARIPLO Foundation
February 2009 - January 2011	"Ricerca in ambito biotecnologico microbiologico e diretta a raccogliere la normativa esistente in materia, le direttive del Ministero dei Beni e delle Attività Culturali, i protocolli, i piani di lavoro, i codici di pratica e quindi l'insieme degli strumenti ad oggi posti in essere da ricercatori, operatori ed Enti coinvolti nel sistema della conservazione dei beni culturali immobili e mobili" - financial support for a two years fellowship	Accordo di Programma con la Regione Lombardia
February 2007-January 2009	PRIN project 2006 "Biotecnologie microbiche per la pulitura di manufatti lapidei di elevato pregio storico artistico: valutazione dell'efficacia e confronto con metodi di pulitura tradizionali"	MIUR
June 2005 – December 2007	Indo-Italian project "Investigation of stone deteriorating microbial strains and application of bioremediating microbial agents on Indian altered stone monuments"	S&T 2005-2007 framework jointly by Indian DST and Italian MAE

June 2002 - July 2005	no. EVK4-2001-00060, "BIOremediation for Building Restoration of the Urban Stone Heritage in European States", BIOBRUSH Project	EU

3.4 Reviewer of international and Italian research projects

- The Israel Science Foundation (ISF)
- Wageningen Institute for Environmental and Climate Research (WIMEK), Wageningen University, The Netherlands - PhD proposal
- Austrian Science Fund (FWF)
- European Research Council (ERC)
- Czech Science Foundation
- Research Foundation Flanders (FWO), Odysseus Programme
- United States Department of Agriculture (USDA/FAS/OCBD)
- PRIN and FIRB projects funded by MIUR (Italian Ministry of Education, University and Research)

Addionally, appointed referee assessor to write a Marie Curie fellowship assessment letter.

3.5 Reviewer of international journals

- Annals of Microbiology,- Applied and Environmental Microbiology,- Applied Microbiology and Biotechnology, - Biofouling, - Biomedical Materials, - Building and Environment, - Chemosphere, - Construction and Building Materials, - Ecological Indicators, - Electronic Journal of Biotechnology, - Environmental Microbiology Reports, - Environmental Science and Pollution Research, - Environmental Science & Technology, - Environmental Sciences Europe, - Fresenius Environmental Bulletin, - Frontiers in Earth Science, - Frontiers in Microbiology, - Frontiers in Microbiotechnology, Ecotoxicology and Bioremediation, - Indoor Air, - International Biodeterioration & Biodegradation, - International Journal of Microbiology, - Journal of Applied and Analytical Pyrolysis, - Journal of Applied Polymer Science, - Journal of Archaeological Science, - Journal of Biomedicine and Biotechnology, - Journal of Chromatography A, - Journal of Cultural Heritage, - Journal of Microbiological Methods, - Nova Hedwigia, - Macromolecular Symposia, - Materials, - Microbial Ecology, - **Nature Communications**, - Naturwissenschaften, - PLOS ONE, - **Science**, - Science of the Total Environment
- AATA Online, Getty Conservation Institute (http://aata.getty.edu/NPS/), contributor abstracting the Annals of Microbiology since 17 June 2003.

3.6 Member of doctoral committees

2013 - present	Food Systems PhD School, Università degli Studi di Milano
2008 - 2015	Chemistry, Biochemistry and Ecology of Pesticides PhD School, Università degli Studi di Milano

3.7 Mentoring of international post-docs and researchers with a master degree

- Dr. Daniel Vázquez Nion, project title 'Posibles repercusións do cambio climático na colonización de rochas graníticas por biofilms subaéreos e nos seus efectos deteriorantes', Departamento de Edafoloxía e Química Agrícola, Facultade de Farmacia, Universidade de Santiago de Compostela, A Coruña, Spain (July 10, 2017 – May 02, 2019)
- Mahgoub Awad-alla Ali, Demonstrator at the Faculty of Archaeology, South Valley University, Qena, Egypt (January 20, 2016 - May 13, 2016)

In addition, 3 master students have been supervised (2 Scienze Applicate ai Beni Culturali, Università degli Studi di Milano and 1 Scienze per i beni culturali archeologici, Università degli Studi di Milano).

4. PUBLICATIONS AND EDITORIAL ACTIVITY

4.1 Editorial activity

18 September 2015 - present	Editor-in-Chief, Annals of Microbiology,
1 January 2014 - 17 September 2015	Associate Editor, Annals of Microbiology
1 August 2012 – 31 December 2018	Review Editor, Frontiers in Microbiology

4.2 Papers published in international peer-reviewed journals with IF

(***** indicates when FC was the corresponding author)

85) Cattò C., de Vincenti L., Borgonovo G., Bassoli A., Marai S., Villa F., **Cappitelli F.***, Saracchi M. 2019. "Sub-lethal concentrations of *Perilla frutescens* essential oils affect phytopathogenic fungal biofilms", Journal of Environmental Management 245, 264-272. IF (2018) 4.865.
84) Gambino M., Sanmartín P., Longoni M., Villa F., Mitchell R., **Cappitelli F.** 2019. "Surface colour: An overlooked aspect in the study of cyanobacterial biofilm formation", Science of the Total Environment 659, 342-353. IF (2018) 5.589.
83) Cattò C., Garuglieri E., Borruso L., Erba D., Casiraghi M.C., **Cappitelli F.**, Villa F., Zecchin S., Zanchi R. 2019. "Impacts of dietary silver nanoparticles and probiotic administration on the microbiota of an in-vitro gut model", Environmental Pollution 245, 754-763. IF (2018) 5.714.
82) Cattò C., Secundo F., Garth J., Villa F., **Cappitelli F.***, 2018. "α-Chymotrypsin immobilised on a low density polyethylene surface successfully weakens Escherichia coli biofilm formation", International Journal of Molecular Sciences 19, 4003; doi:10.3390/ijms19124003. IF (2018) 4.183.
81) Vázquez-Nion D., Troiano F., Sanmartín P., Valagussa C., **Cappitelli F.**, Prieto B. 2018. "Secondary bioreceptivity of granite: effect of salt weathering on subaerial biofilm growth", Materials and Structures, 51:158. IF (2018) 2.548.
80) Cattò C., Villa F., **Cappitelli F.*** 2018. "Recent progress in bio-inspired biofilm-resistant polymeric surfaces", Critical Reviews in Microbiology 44, 633-652. IF (2018) 5.697.
79) Gulotta D., Villa F., **Cappitelli F.**, Toniolo L. 2018. "Biofilm colonization of metamorphic lithotypes of a Renaissance cathedral exposed to urban atmosphere", Science of the Total Environment 639, 1480-1490. IF (2018) 5.589.
78) De Vincenti L., Glasenapp Y., Cattò C., Villa F., **Cappitelli F.**, Papenbrock J. 2018. "Hindering the formation and promoting the dispersion of medical biofilms: non-lethal effects of seagrass extracts", BMC Complementary and Alternative Medicine, 18:168, https://doi.org/10.1186/s12906-018-2232-7. IF (2018) 2.479.
77) Okpalanozie O. E., Adebusoye S. A., Troiano F., Cattò C., Ilori M. O., **Cappitelli F.** 2018. "Assessment of indoor air environment of a Nigerian museum library and its biodeteriorated books using culture-dependent and -independent techniques", International Biodeterioration & Biodegradation 132, 139-149. IF (2018) 3.824.
76) Cattò C., James G., Villa F., Villa S., **Cappitelli F.*** 2018. "Zosteric acid and salicylic acid bound to a low density polyethylene surface successfully control bacterial biofilm formation", Biofouling 34, 440-452. IF (2018) 2.847.
75) Garuglieri E., Meroni E., Cattò C., Villa F., **Cappitelli F.***, Erba D. 2018. "Effects of sub-lethal concentrations of silver nanoparticles on a simulated intestinal prokaryotic-eukaryotic interface", Frontiers in Microbiology Volume 8, Article 2698. IF (2018) 4.259.
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1) Zanardini E., **Cappitelli F.**, Ranalli G., Sorlini C. 2005. "Metalli" in La biologia vegetale per i beni culturali, Vol I., ed. Caneva G., Nugari M. P., Salvadori O., Nardini Editore, Firenze, 152-155.

4.6 Italian patent

MI2006A000776, 19.04.2006, "Procedimento di biopulitura di superfici di manufatti di diversa natura chimica ed edifici", inventors Claudia Sorlini, **Francesca Cappitelli**, Elisabetta Zanardini, Giancarlo Ranalli.

4.7 Papers published in Italian and international journals without IF

9) Cappitelli F., 2016. "Biocleaning of Cultural Heritage Surfaces" in The Open Conference Proceedings Journal 7, (suppl 1: M6) 65-69.
8) Tarsitani G., Moroni C., Cappitelli F., Pasquariello G., Maggi O., 2014. "Microbiological analysis of surfaces of Leonardo da Vinci's Atlantic Codex: biodeterioration risk" in International Journal of Microbiology, Volume 2014, Article ID 214364.
7) Ranalli G., Belli C., Alfano G., Lustrato G., Zanardini E., **Cappitelli F.**, Sorlini C. 2009. "Bio-cleaning of cultural heritage surfaces: biotechnological contributions. Bioremediation of works of art", Household and Personal Care TODAY 3, 36-39.
6) Sorlini C., **Cappitelli F.** 2008. "The application of viable bacteria for the biocleaning of cultural heritage surfaces" COALITION, 15, 18-20 (http://www.rtphc.csic.es/issues/15_5.pdf, 15 September 2014).
5) **Cappitelli F.**, Sorlini C. 2006. "Potenzialità delle tecniche di biologia molecolare per lo studio di biodeteriogeni presenti nell'aria", XI Congresso Nazionale dell'Associazione Italiana di Aerobiologia, GEA, Giornale Europeo di Aerobiologia, ISSN 1127-0810, 1, 113-114.
4) **Cappitelli F.** 2002. "I leganti nella pittura del XX secolo: storia e indagine diagnostica", Kermes 47, 35-40.

3) **Cappitelli F.** 2000. "Difficulties in the scientific study of synthetic materials in paints", V∓A Conservation Journal 34, spring, 13-14.
2) **Cappitelli F.**, Jones H. 2000. "Defining conservation science: training and the profession", V&A Conservation Journal 36, autumn, 15-16.
1) **Cappitelli F.**, Iozzi F. 1998. "DNA, ultima frontiera del calcolo?", Lettera Matematica PRISTEM, Centro Eleusi Università Bocconi, 27-28 March-June, 14-19.

4.8 Full papers published in Proceedings and Pre-prints

5) Gulotta D., Bertoldi M., Bortolotto S., Polo A., **Cappitelli F.**, Toniolo L. 2012. "The Richini Courtyard in Milan: Characterisation of the restoration materials and decay evaluation", "VII Congresso A.I.Ar.", 22-24 February 2012, 1-8, Modena, Italy.
4) Polo A., **Cappitelli F.**, Giacomucci L., Troiano F., Cattó C., Sorlini C. 2011. **"**Alterative microorganisms living on stone artworks exposed to environmental stress conditions**"**, "Microbial Diversity 2011. Environmental stress and adaptation. Congress of Società Italiana di Microbiologia Agraria, Alimentare e Ambientale (SIMTREA)", 26-28 October 2011, Milan.
3) Sorlini C., **Cappitelli F.**, Ranalli G. 2008. "Viable bacteria for the biorecovery of deteriorated cultural heritage surfaces. the case of the monumental cemetery frescies of Pisa", "XXX National congress on calorimetry, thermal analysis and chemical thermodynamics" Proceedings, 9-12 December 2008, Pisa, Italy.
2) **Cappitelli F.**, Zanardini E., Abbruscato P., Ranalli G., Sorlini C. 2003. "Selection of biological agents with bioremedial activity on stones in Historic Cities", "7th OWHC International Symposium" Proceedings, 23 - 26 September 2003, Rodhes, Greece.
1) **Cappitelli F.** 2000. "An improved methodology for the chemical characterisation of alkyd-based paints", "Gerry Hedley Student Symposium" Proceedings, 2 June 2000, 69-73, NewCastle, UK.

4.9 Congress abstracts

16) **Cappitelli F.**, "Biorestauro: i batteri amici", La biologia applicata ai beni culturali: dalla diagnostica all'intervento conservativo, Venaria Reale (Turin), 10 May 2013, 15. .
15) **Cappitelli F.**, Forlani F., Gelain A., Ottolina G., Secundo F., Sorlini C., Villa F., Villa S., Vitali A., "ANFOMAT - Novel materials for medical devices based on biofunctionalized surfaces with antifouling properties", III Convegno Nazionale SIMTREA, Bari 26-28 June 2012, 170.
14) Villa F., Salvadori O., Albanese D., **Cappitelli F.**, "Cyanobacteria cause black staining of the National Museum of the American Indian Building (Washington, D.C., USA)", III Convegno Nazionale SIMTREA, Bari 26-28 June 2012, 179.
13) Sorlini C., Giacomucci L., Salvadori O., Bertoncello R., Martini I., Favaro M., Villa F., **Cappitelli F.** "Biodeterioration of Artistic Tiles from the Facade of the Grande Albergo Ausonia & Hungaria (Venice, Italy)", 5th International Congress "Science and Technology for the Safeguard of Cultural Heritage in the Mediterranean Basin", Istanbul, Turkey, 22-25 November 2011, 167
12) **Cappitelli F.**, Pasquariello G., Tarsitani G., Moroni C., Maggi O., Sorlini C., "Evaluation of microbial contamination of artworks on paper and environments of cultural heritage", "Cultural Heritage Cairo 2009, 4th International Congress "Science and Technology for the Safeguard of Cultural Heritage of the Mediterranean Basin", Cairo, Egypt, 197-198.
11) Ranalli G., Zanardini E., **Cappitelli F.**, Sorlini C., "Impiego di microrganismi nella pulitura di affreschi", Il Camposanto di Pisa: un progetto di restauro integrato, Opera della Primaziale Pisana, 6-8 March 2008, Pisa, Italy, 38-41.
10) Ranalli G., Zanardini E., **Cappitelli F.**, Sorlini C., "Biorestauro: tecniche innovative di pulitura con microrganismi", Tecniche dell'informazione e della comunicazione culturale, Tokyo 16-17 April 2007, primavera italiana, Italia in Giappone, CNR, 46 e Multi-quality approach to cultural heritage, CNR, 14-15 November 2006, Roma, 61-62.
9) Villa F., Principi P., Zanardini E., **Cappitelli F.**, Giussani B., Sorlini C., "Dinamica della comunità ammonio-ossidante tramite PCR in situ del gene funzionale amoA in un sistema di depurazione a fanghi attivi contaminati da rame", SIMTREA, 17-18 July 2006, Bologna, Italy, 41.
8) **Cappitelli F.**, Principi P., Sorlini C., "Il biodeterioramento dei polimeri sintetici componenti o consolidanti/protettivi delle opere d'arte", SIMTREA, 17-18 July 2006, Bologna, Italy, 47.

7) **Cappitelli F.**, Ranalli G., Zanardini E., Mello E., Sorlini C., "Biotreatment of salts in stone at Matera Cathedral", Heritage, Microbiology and Science, University of Portsmouth, 29 June-2 July 2005, Portsmouth, UK.
6) **Cappitelli F.**, Zanardini E., Toniolo L., Abbruscato P., Ranalli G., Sorlini C., "Bioconservation of the marble base of the Pietà Rondanini by Michelangelo Buonarroti", Geophysical Research Abstracts, Vol. 7, 06675, 2005, SRef-ID: 1607-7962/gra/EGU05-A-06675, European Geosciences Union 2005.
5) **Cappitelli F.**, Abbruscato P., Zanardini E., Ranalli G., Realini M., Sorlini C., The EU funded project "Bioremediation for Building Restoration of the Urban Stone Heritage in European States (BIOBRUSH)", Air Pollution and Cultural Heritage Workshop, 1-3 December 2003, Seville, Spain, 53-54.
4) **Cappitelli F.**, Zanardini E., Principi P., Abbruscato P., Vicini S., Princi E., Sorlini C., "Il biodeterioramento di resine sintetiche usate come leganti", Biologia e Beni Culturali, A.i.A.r., 22-23 September 2003, Villa Gallia, Como, 24.
3) Sorlini C., Zanardini E., **Cappitelli F.**, Abbruscato P., Zangrossi M., Realini M., Ranalli G., "Il progetto europeo "Bioremediation for Building Restoration of the Urban Stone Heritage in European States (BIOBRUSH)", Biologia e Beni Culturali, A.i.A.r., 22-23 September 2003, Villa Gallia, Como, 30-31.
2) Zanardini E., Abbruscato P., **Cappitelli F.**, Realini M., Sorlini C., "Studio delle croste nere presenti sul marmo di Condoglia del Duomo di Milan", Biologia e Beni Culturali, A.i.A.r., 22-23 September 2003, Villa Gallia, Como, Italy, 32.
1) **Cappitelli F.**, Sorlini C., "Biodeterioration and bioremediation of cultural heritage surfaces made of stone", in Surface reactivity in minerals, Università degli Studi di Milano and Università degli Studi Milano-Bicocca, Gargnano, Brescia, Italy, 9.

4.10 Posters

27) Meroni E., Domingo G., Erba D., Cattò C., **Cappitelli F.**, Vannini C., Bracale M. "Effects of sub-lethal concentrations of silver nanoparticles on Caco-2 cells" - V International Conference on Foodomics: from Data to Knowledge, Cesena (Italy), 10th -12th January 2018.
26) De Vincenti L., Cattò C., Borgonovo G., Bassoli A., Saracchi M., Villa F., **Cappitelli F.** "Evaluation of anti-biofilm property of Perilla frutescens essential oils against plant pathogenic fungi"- IV International Conference on Antimicrobial Research (ICRA 2016), Torremolinos-Malaga (Spain), 29th June-1st July 2016.
25) Garuglieri E., Zanchi R., Cattò C., Troiano F., De Vincenti L., **Cappitelli F.** " Unraveling the effects of food-related engineered NANOparticles on the GUT interactive ecosystem (NanoGut)""- III Conference on Microbial Diversity: The Challenge of Complexity, Congress of Italian Society for Agricultural, Food and Environmental Microbiology (SIMTREA), Perugia (Italy), 27th–29th October 2015.
24) Cattò C., Garuglieri E., Villa F., **Cappitelli F.** "NanoGut - Unraveling the effects of food-related engineered NANOparticles on the GUT interactive ecosystem"- Human Gut Microbiome and Diseases Congress, Milan (Italy), 25th–26th June 2015.
23) Dell'Orto S., Gelain A., Cattò C., Villa F., Forlani F., **Cappitelli F.**, Villa S. "Antifouling agents: functionalization of surfaces to obtain novel medical devices materials inhibiting biofilm formation" - XXIII International Symposium on Medicinal Chemistry (EFMC-ISMC 2014), Lisbon (Portugal), 7th-11th September 2014.
22) Cattò C., Villa F., Dell'Orto S., Villa S., Gelain A., Forlani F., **Cappitelli F**. "Novel anti-biofilm materials for medical devices based on biofunctionalized surfaces" – Montana Biofilm Meeting. Bozeman (MT, USA), 15th -17th July 2014.
21) Cattò C., Baroni S., Villa F., Polo A., **Cappitelli F.**, Dell'Orto S., Gelain A., Villa S., Vitali A., Forlani F.,"Exploring molecular target and pathways involved in the antibiofilm activity of zosteric acid by multi-strategy proteomic approach"- 57th National Meeting of the Italian Society of Biochemistry and Molecular Biology, Ferrara (Italy), 18th -20th September 2013.
20) **Cappitelli F.**, Cattò C., Villa F., Polo A., Forlani F., Dell'orto S., Gelain A., Villa S. "Exploring the anti-biofilm activity of zosteric acid via high-throughput screening of a small molecules scaffold-based library" – Microbial Interactions in Complex Ecosystems, Congress of Italian Society

for Agricultural, Food and Environmental Microbiology (SIMTREA). Turin (Italy), 23th-25th October 2013.
19) Villa S., Dell'Orto S., Gelain A., Villa F., Cattò C., **Cappitelli F**. "Structure activity relationship of zosteric acid analogues as inhibitors of biofilm formation by Escherichia coli" – New perspective in pharmaceutical chemistry. Savigliano (Italy), 29th-31st May 2013.
18) **Cappitelli F.**, Cardinali G., Basaglia M., Daffonchio D., Gobbetti M., Neviani E., "Italian Society for Agriculture, Food and Environmental Microbiology (SIMTREA) - Education", 5th Congress of European Microbiologists (FEMS 2013), Leipzig, Germany, 21-25 July, 2013.
17) **Cappitelli F.**, Forlani F., Gelain A., Ottolina G., Secundo F., Sorlini C., Villa F., Villa S., Vitali A., "ANFOMAT Novel materials for medical devices based on biofunctionalized surfaces with antifouling properties", III Convegno Nazionale SIMTREA, Bari 26-28 June, 2012.
16) Villa F., Salvadori O., Albanese D., **Cappitelli F.**, "Cyanobacteria cause black staining of the National Museum of the American Indian Building (Washington, D.C., USA)", III Convegno Nazionale SIMTREA, Bari 26-28 June, 2012.
15) Sanmartín P., Villa F., Silva B., **Cappitelli F.**, Prieto B., "Evaluation of three biocide strategies in planktonic *Nostoc* sp. PCC 9104 stone biofilm-forming cyanobacterium by quantification of the color variations", 10th International Conference on non-destructive investigations and microanalysis for the diagnostics and conservation of cultural and environmental heritage", Firenze (Italy), 13-15 April, 2011.
14) Parini G., Villa F., **Cappitelli F.**, Roda G., Secundo F., "Immobilized enzyme on a plastic surface: how to weaken a biofilm", COST Exploratory Workshop on "Biofilms -- Friend or Foe?", Berlin (Germany), 22-23 June 2011.
13) Villa F., Remelli W., Guerrieri N., Forlani F., **Cappitelli F.** "Adaptative responses of Azotobacter vinelandii biofilm to oxidative stress: functional role of the rhodanese-like protein RhdA", Environmental stress and adaptation, MD 2011, Milan (Italy), 26-28 October 2011.
12) Villa F., Pitts B., Stewart P. S., Giussani B., Albanese D., **Cappitelli F.**, "Efficacy of zosteric acid against *Candida albicans* biofilm", Biofilm Science & Technology Meeting, Bozeman, Montana, USA, 7-9 July 2009.
11) Villa F., Polo A., Principi P., Giacomucci L., Sorlini C., **Cappitelli F.**, "New environmental-friendly approaches against detrimental biofilms", SIMTREA, Sassari, 9-12 June 2009.
10) **Cappitelli F.**, Fermo P., Piazzalunga A., Vecchi R., Valli G., Sorlini C., Zanardini E., "Chemical-physical and aerobiological measurements for indoor air quality at the Ca' Granda historical Archive, Milan (Italy)", Conservation Science 2007, Milan 10-11 May 2007.
9) **Cappitelli F.**, Principi P., Sorlini C., "Il biodeterioramento dei polimeri sintetici componenti o consolidanti/protettivi delle opere d'arte", SIMTREA, Bologna 17-18 July 2006.
8) Villa F., Principi P., Zanardini E., **Cappitelli F.**, Giussani B., Sorlini C., "Dinamica della comunità ammonio-ossidante tramite PCR in situ del gene funzionale amoA in un sistema di depurazione a fanghi attivi contaminati da rame", SIMTREA, Bologna, Italy, 17-18 July 2006.
7) **Cappitelli F.**, Sorlini C., Pedemonte E. , Princi E. , Vicini S., "Mechanical characterisation of paper and cellulose based textiles affected by fungal deterioration and consolidate with acrylic polymers", "Science, Technology and Cultural Heritage" workshop, Catania, Italy, 9-11 November 2005.
6) **Cappitelli F.**, Sorlini C., "Biotechnologies and cultural heritage", COST Strategic Workshop - "COST and Cultural Heritage: Crossing Borders", Firenze, 20-22 October 2005.
5) Laguardia L., Vassallo E., **Cappitelli F.**, Cremona A., Mesto E., "Plasma Treatment for Restoration and Conservation of Paper Cultural Heritage", IVC-16 (16th International Vacuum Congress); ICSS-12 (12th International Conference on Solid Surfaces), NANO-8 (8th Int. Conference on Nanometer Scale Science and Technology); AIV-17 (17th Vacuum National Symposium), Venezia, June 28 - July 2, 2004.
4) Depero L.E., Sorlini C., Toniolo L., **Cappitelli F.**, Bontempi E., Abbruscato P., Pedrazzani R., Zanardini E., "Investigation of the damage caused by microorganisms colonizing Candoglia marble of Milan cathedral" Archeometry 2004, Saragoza, Spain, 3-7 May 2004.
3) **Cappitelli F.**, Zanardini E., Principi P., Realini M., Sorlini C., "Investigation on biodegradability of synthetic binders in paints by fungi" ICOM-CC Working Group "Modern Materials" Interim Meeting, Colonia, Germany, 12-14 March 2001, 68.

2) **Cappitelli F.**, Learner T., "Thermally assisted hydrolysis and methylation- pyrolysis - gas chromatography / mass spectrometry for the chemical characterisation of synthetic binders in paints" ICOM-CC Working Group "Modern Materials" Interim Meeting, Cologne, Germany, 12-14 March 2001, 66-67.
1) **Cappitelli F.**, Zanardini E., Principi P., Realini M., Sorlini C., "Fungal attack on synthetic binders", London Materials Society/South Kensington Forum, London, UK, 26 October 2000.

4.11 Interviews and TV programmes

- Participation in Superquark biology, 21 August 2014.
- Interview released to Chemical & Engineering News "For Cave's Art, An Uncertain Future. Disagreement on conservation course of action complicates a potential reopening", 24 October 2011.
- Interview released to Corriere della Sera "Batteri mangiasmog per curare la Pietà", 25 November 2010.
- Interview released to Omnimilano "Monumenti, batteri per restaurarli: alla Statale arriva la biopulitura", 26 November 2009.
- Interview released to Il sole 24 ore "Pulizia a regole d'arte", NOVA, 31 January 2008.
- Interview released to Deutsche Welle radio "Scientists Turn to Bacteria to Clean Europe's Architectural Gems" 25 December 2007.
- Interview released to Il sole 24 ore, "Così creiamo i batteri per pulire i monumenti", 16 November 2007.
- Interview released to Der Spiegel "Mikroben in Kultur" (numero 16 10.4.04, pagina 142).
- Participation in Superquark biology, "Batteri per restauri", 23 August 2004.
- Participation in "La maratona dell'innovazione" organizzata dalla Camera di Commercio di Milano, 10 July 2006, Milan.

5. TEACHING ACTIVITIES

5.1 Erasmus+ staff mobility

Duration	*Lecture title / programme*	*University*
12-18 May 2019	"Biocleaning/bioconsolidation and preventive/control strategies" , Master in Conservation of Cultural Heritage (8 hours lectures)	University of West Attica - Campus 1, Greece
15-20 May 2018	"Biodeterioration of organic and inorganic cultural heritage", Master in Conservation of Cultural Heritage (8 hours lectures)	University of West Attica - Campus 1, formerly Athens University of Applied Science (TEI), Greece

5.2 Undergraduate and graduate courses leading to a Bachelor of Science (BS) and Master of Science (MS) degrees

Duration / academic years	*Course title*	*University*
From 2010/2011 to 2018/2019	"Microbiologia per i Beni Culturali (Microbiology for cultural heritage)" (6 credits), BS "Scienze e tecnologie per lo studio e la conservazione dei beni culturali e dei supporti della informazione"	Università degli Studi di Milano, Faculty of Science and Technolgy
July 2012	"Microbiology for the conservation of cultural heritage", Master in Conservation and Restoration of Architectural Heritage (FORMAZIONE AL RESTAURO) (12 hours lectures plus in-situ activities)	State University of Architecture and Construction of Yerevan Yerevan, Armenia (in collaboration with Politecnico di Milano)

From 2005/2006 to 2018/2019, with the exception of 2009/2010	"Microbiologia Agraria (Agricultural Microbiology)" (6 credits) BS "Scienze e Tecnologie Agrarie"	Università degli Studi di Milano, Food and Agricultural Faculty
2009/2010, 2010/2011	"Microbiologia con Laboratorio" (4 credits) BS "Scienze Ambientali"	Università degli Studi dell'Insubria, Faculty of Science (Como)
2006/2007, 2007/2008, 2008/2009	"Biotecnologie applicate alla conservazione dei beni culturali (Biotechnology applied to the conservation of cultural heritage)" (4 credits), BS and MS "Biotecnologie agrarie vegetali"	Università degli Studi di Milano, Agricultural Faculty
2004/2005, 2005/2006	"Microbiologia per il restauro (Cultural heritage microbiology)" (4 credits), MS "Scienze e Tecnologie per i Beni Archeologici e Artistici"	Università degli Studi di Padova, Faculty of Science
February 2001	Biology applied to cultural heritage course (24 hours)	Malta Centre for Restoration, Kalkara, Malta

Additional teaching activities include classes and lab teaching for the courses Agricultural Microbiology and Microbiology, Università degli Studi di Milano, BS "Scienze e Tecnologie Agrarie" and BS "Biotecnologie Agrarie Vegetali" in the academic years 2002/2003, 2003/2004, 2004/2005.

5.3 Post-graduate courses

Duration	*Course title (hours)*	*Promoting body*
From 2015/2016 to 2018/2019	"Corso integrato di biotecnologie avanzate applicate ai beni culturali, laboratorio", MS "Scienze per la conservazione e la diagnostica dei beni culturali" (2-credit module, 16 hours)	Università degli Studi di Milano, Faculty of Science and Technolgy
February - March 2010	"Biotecnologie microbiche per la conservazione dei beni culturali", master "Organismi e biotecnologie per la conservazione dei beni culturali" (20 hours)	Polo per la Valorizzazione dei Beni Cultuali coordinated by the Lombardy Region, Milano
November 2007 and November 2008	"Microbiologia per il restauro" master in "Gli agenti di biodeterioramento dei beni culturali" (12 hours)	Cattolica del Sacro Cuore University, Piacenza
April 2005 and March 2007	"Microrganismi e materiali archeologici" (24 hours), master in "Scienze per i Beni Culturali Archeologici: figure professionali di Geoarcheologo ed Archeometra" (2005); master in "Scienze per i Beni Culturali Archeologici" (2007)	Università degli Studi di Milano
March - May 2004	"Biotecniche per la conservazione e il restauro" (16 hours lectures, 8 hours lab) master in "Digitalizzazione, conservazione e restauro dell'informazione e dei supporti informativi"	Università degli Studi di Milano, Dipartimento di Informatica e Comunicazione

January 1997-February 1997	Biology applied to cultural heritage course	Centro Sviluppo Imprenditoria Piacentina s.c.r.l., Piacenza

5.4 Supervision of PhD students

Name	*Organisation*	*Graduation*
Luca de Vincenti	Food Systems PhD School, Università degli Studi di Milano	December 2018
Elisa Garuglieri	Food Systems PhD School, Università degli Studi di Milano	December 2016
Grace Kim (27 May-24 June 2014 and 18 September-29 December 2015)	History, Anthropology, and Science, Technology, and Society program, MIT, USA	Visiting PhD student
Ogechukwu Elizabeth Okpalanozie, (15 February - 31 July 2014)	University of Lagos, Nigeria	Visiting PhD student
Michela Gambino (co-supervisor)	Doctorate School in Biomolecular Sciences, Università degli Studi di Milano	May 2015
Cristina Cattó (co-supervisor)	Pesticide PhD School, Università degli Studi di Milano	December 2014
Federica Troiano	Pesticide PhD School, Università degli Studi di Milano	January 2013
Patricia Sanmartin Sanchez, visiting PhD student (1 February - 30 April 2010)	Universidad de Santiago de Compostela, Spain	Visiting PhD student
Lucia Giacomucci	Pesticide PhD School, Università degli Studi di Milano	January 2012
Andrea Polo	Pesticide PhD School, Università degli Studi di Milano	December 2010

- External examiner of PhD candidates

- Daniela Saviello, Politecnico di Milano, Italy (2015)
- Caroline Paula Kye, The University of Melbourne, Australia (2015)
- Mona Soleymani, University of Canberra, Australia (2014)
- Patricia Sanmartin Sanchez, Universidad de Santiago de Compostela, Spain (May 2012)

5.5 Supervision of BS and MS students

Name of the students	*Erasmus students*	*Research stay period*
Valentin Krausch	Bachelor of Biology (DUT), University of Cergy-Pontoise, France	10 April 2017 - 16 June 2017
Cynthia Faure	Bachelor of Biology (DUT), University of Cergy-Pontoise, France	11 April 2016 - 17 June 2016

No. of students	*Master degree*
2	Ingegneria Civile indirizzo architettonico, Università degli Studi di Brescia
3	Biotecnologie Agrarie Vegetali, Università degli Studi di Milano
2	Biotecnologie per l'Industria e l'Ambiente, Università degli Studi di Milano
2	Scienze e Tecnologie per i Beni Archeologici e Artistici, Università degli Studi di Padova
3	Scienze Ambientali, Università degli Studi dell'Insubria
1	Biotecnologie Industriali, Università degli Studi di Bologna

1	Scienze della Produzione e Protezione delle Piante, Università degli Studi di Milano
1	Alimentazione e Nutrizione Umana, Università degli Studi di Milano
2	Biotecnologie Industriali, Università degli Studi di Milano-Bicocca
2	Scienze per la Conservazione e la Diagnostica dei Beni Culturali

Total: 19 students

No. of students	*Bachelor degree*
8	Scienze e Tecnologie Agrarie, Università degli Studi di Milano
3	Scienze Ambientali, Università degli Studi dell'Insubria
2	Scienze e Tecnologie per i Beni Archeologici e Artistici, Università degli Studi di Padova
4	Biotecnologie vegetali, alimentari e agroambientali, Università degli Studi di Milano
28	Scienze e Tecnologie per lo Studio e la Conservazione dei Beni Culturali e dei Supporti della Informazione, Università degli Studi di Milano
1	Biotecnologie per l'Industria e l'Ambiente, Università degli Studi di Milano

Total: 46 students

In addition, 1 student attending the Scuola of Alta Formazione, Opificio delle Pietre Dure, Florence, has been supervised.

5.6 Seminars upon invitation

Date	*Title*	*Organisation*	*Place*
23 December 2015	"Recent Advances in Cultural Heritage Microbiology"	Ben Gurion University of the Negev	Boqer Campus, Israel
26 August 2014	"Microbes & art: friends or foes?"	Northwestern University / Art Institute of Chicago, Center for Scientific Studies in the Arts	Chigago, USA
4 July 2014	"Natura, significato e ruolo dei biofilm microbici nelle industrie alimentari"	Agripolis, Università degli Studi di Padova	Legnaro, Padova
24 April 2013	"Should I say or should I go? A biofilm story"	Leibniz Universität, Institut für Botanik	Hannover, Germany
2 August 2012	"Cultural heritage microbiology and biofilm research"	McGill University, Department of Microbiology and Immunology	Montreal, Canada
10 June 2011	"Il biodegrado dei materiali contemporanei"	Opificio delle Pietre Dure	Florence
12 May 2010	"Casi studio di biodeterioramento e biorestauro"	Università degli Studi di Genova	Genoa
17 April 2008	"Il biodeterioramento dei materiali esposti all'aperto, nozioni di base sui microorganismi e la loro azione sui materiali lapidei"	Politecnico di Milano, Dipartimento di Chimica, Materiali e Ingegneria Chimica "Giulio Natta"	Milan
14 March 2008	"Pulitura con microrganismi"	Politecnico di Milano	Milan

6 December 2004	"Microrganismi e restauro"	Università dell'età libera, Associazione Culturale fondata dai Lions Viterbesi	Viterbo
2 April 2002	"Introduzione ai leganti del XX secolo e loro indagine diagnostica"	Università degli Studi di Genova, Dipartimento di Chimica e Chimica Industriale	Genoa
5 April 2001	"Gas chromatography-mass spectrometry and related techniques	Tate Gallery, Conservation Department	London, UK
March 1999, March 2000, March 2001	"Biodeterioration of works of art", "Dating wood", "The significance of the identification of binding media with an emphasis on 20th century art"	Victoria & Albert Museum, Conservation Department	London, UK

6. DEPARTMENTAL AND UNIVERSITY SERVICE

6.1 Teaching service activities

Duration / academic year	*Activity*
2015-present	Person in charge of the Erasmus studentships, BS in *Scienze e tecnologie per lo studio e la conservazione dei beni culturali e dei supporti della informazione* and MS in *Scienze per la conservazione e la diagnostica dei beni culturali*
November 2013 – September 2014 and May 2019 - present	Member of the steering committee (*Comitato di Direzione*) of the Agricultural and Food Faculty
2013-2014	Member of Students-Professors joint committee (*commissione paritetica*), BS in *Scienze e tecnologie per lo studio e la conservazione dei beni culturali e dei supporti della informazione*
2012-2013	Person in charge of the student transfers (*piani di studio e per i trasferimenti*), BS in *Scienze e tecnologie per lo studio e la conservazione dei beni culturali e dei supporti della informazione*
From 2012-2013 to 2018-2019	Member of the teaching committee (*commissione didattica*), BS in *Scienze e tecnologie per lo studio e la conservazione dei beni culturali e dei supporti della informazione*
2006-2008	Member of the steering board of the Master in *Scienze per i beni culturali archeologici*, Università degli Studi di Milano, Faculty of Science

6.2 Research and evaluation service activities

Duration	*Activity*
Since July 2015	Coordinator of the Cultural Heritage Center (CRC Beni Culturali) of the University of Milan
Since December 2014	Coordinator of the departmental quality team (Gruppo di lavoro "Politica per l'assicurazione di qualità del Dipartimento") and since July 2017 departmental contact person of Presidio di Qualità responsible for quality in the department

March 2013 - September 2014 and November 2017- present	Member of the executive committee (*giunta*) of the Dipartimento di Scienze per gli Alimenti, la Nutrizione e l'Ambiente
June 2010 - December 2012	Member of the bibliometric analysis and teaching evaluation team (project title "Ricerca sulla Valutazione di Unimi (UNIMIVAL))", Università degli Studi di Milano
February 2007 present	Delegate of the Department of Food Science and Microbiology and member of the steering committee of the Centro Interdipartimentale di Ricerca e Servizi per i Beni Culturali (Cultural Heritage Centre), Università degli Studi di Milano
August 2008 - May 2010	Member of Segreteria Tecnica (steering committee), including representatives of Università degli Studi di Milano, Università degli Studi di Pavia, Politecnico di Milano, Università degli Studi di Milano-Bicocca and Lombardy Region; Accordo di Programma of the Lombardy Region, Direzione Generale Culture, Identità e Autonomie della Lombardia. The aim of the steering committee was to coordinate the academic activities in the field of cultural heritage.

7. PARTICIPATION IN PROFESSIONAL ASSOCIATIONS

October 2011 – December 2018	Member of Ente Nazionale Italiano di Unificazione (UNI), member of the European Committee for Standardization. Technical group: Beni Culturali - Normal, GL8 Biology
January 2010 - present	Federation of European Microbiological Societies (FEMS). Member of the Education group since 17 October 2012.
January 2010 - present	Società Italiana Microbiologia Generale Biotecnologie Microbiche (SIMGBM)
June 2008 - present	Forum UNESCO-University and Heritage Network
March 2008 - present	International Network for the Conservation of Contemporary Art (INCCA). From March 2008 to Febraury 2010 jr person in charge for the diagnostic area of INCCA Italia.
2007 - 2010	Associazione Italiana Areobiologia (AIA) and International Association of Aerobiology (IAA)
2005-2010	American Society for Microbiology (ASM)
January 2004 - present	Italian Society for Agriculture, Food and Environmental Microbiology (SIMTREA)
July 2002 - present	The International Council of Museums (ICOM) since. 2003-2008 mediator/facilitator for the topic biodeterioration of modern materials, ICOM-CC Working Group Modern Materials and Contemporary Art
2001-2008	Institute of Conservation Science (ICS)

8. CONFERENCE PARTICIPATION

8.1 Chairperson

- "Biodeterioration and preservation of desert archaeological sites" in Drylands, Desert and Desertification, Sede Boqer Campus, Israel, 6 November 2017.
- "Communicating microbiology through popular magazines, the press and open internet resources" round table, in Microbiology Education and Communication Symposium of FEMS Microbiology Congress 2015, Maastricht, The Netherlands, 10 June 2015.
- "European Conference of Biodeterioration of Stone Monuments", Universitè de Cergy-Pontoise, Cergy-Pontoise, France, 7 November 2014.
- "Convegno ANFOMAT - Novel materials for medical devices based on biofunctionalized surfaces with antifouling properties", Università degli Studi di Milano, Milan, 21 February 2014.

- "Conservation Science 2007" organised by Politecnico di Milan in collaboration with University of Milan, The Institute of Conservation Science (UK) and The Institute of Conservation (UK), Milan, 10-11 May 2007.
- "Science, Technology and Cultural Heritage", Museo Diocesano, Catania, organised by Associazione Italiana del Vuoto (AIV) in collaboration with Associazione Italiana di Scienza e Tecnologia della Macromolecole (AIM), 9-11 November 2005.
- "Plastics - past and present, 4th symposium on conserving synthetic materials", Vitra Design Museum, Weil am Rhein, Germania, AXA Art Conservation Project in collaboration with the Vitra Design Museum, 24-25 November 2004.

8.2 Member of organising committees

- "Workshop BioStone. Unraveling mechanisms of BIO-deterioration of STONES in historical sites: methodologies for preserving cultural heritage", organised by Università degli Studi di Milano and Ben Gurion University, Israel, 26 May 2017.
- "2nd European conference on Biodeterioration of stone monuments", organised by Universitè de Cergy-Pontoise and Università degli Studi di Milano, Cergy-Pontoise, France, 17-18 November 2016.
- "Unraveling the effects of food-related engineered NANOparticles on the GUT interactive ecosystem", organised by Università degli Studi di Milano, Milan, 15 September 2016.
- "13th Symposium on Bacterial Genetics and Ecology (BAGECO13)", Università degli Studi di Milano, Milan, 14-18 June 2015.
- "Convegno ANFOMAT - Novel materials for medical devices based on biofunctionalized surfaces with antifouling properties", Università degli Studi di Milano, Milan, 21 February 2014.
- "IX Workshop Doctorate in Chemistry, Biochemistry and Ecology of Plant Protection Products and Xenobiotics", Università degli Studi di Milano in collaboration with Università Cattolica di Piacenza, Milan, 27-28 January 2014.
- "VII Workshop Doctorate in Chemistry, Biochemistry and Ecology of Plant Protection Products and Xenobiotics", Università degli Studi di Milano in collaboration with Università Cattolica di Piacenza, Milan, 26-27 January 2012.
- "Microbial Diversity 2011, Environmental Stress and Adaptation", SIMTREA, Milan, 26-28 October 2011.
- "VI Workshop Doctorate in Chemistry, Biochemistry and Ecology of Plant Protection Products and Xenobiotics", Università degli Studi di Milano in collaboration with Università Cattolica di Piacenza, Milan, 20-21 December 2010.
- "V Workshop Doctorate in Chemistry, Biochemistry and Ecology of Plant Protection Products and Xenobiotics", Università degli Studi di Milano in collaboration with Università Cattolica di Piacenza, Milan, 18-19 January 2010.
- "Conservation Science 2007", organised by Politecnico di Milan with University of Milan, The Institute of Conservation Science (UK) and The Institute of Conservation (UK), Milan, 10-11 May 2007.

8.3 Member of scientific committees

- "Conservation Science 2007" Politecnico di Milan in collaboration with Università degli Studi di Milano, The Institute of Conservation Science (UK) and The Institute of Conservation (UK), Milan, 10-11 May 2007.
- "Science, Technology and Cultural Heritage" Associazione Italiana del Vuoto (AIV) in collaboration with Associazione Italiana di Scienza e Tecnologia della Macromolecole (AIM), Catania, Italy, 9-11 November 2005.

8.4 Invited speaker

- "Role of microorganisms in the conservation of stone heritage", Conservation of Art, Tel Aviv, Israel, Israeli Ministry of Science and Technology and the Italy-Israel Chamber of Commerce and Industry, 13-15 March 2018.

-"Importance of Interactions in the Tripartite System Stone/Biofilm/Air", Gordon Research Conference, Scientific Methods in Cultural Heritage Research, Gordon Research Conferences, Newry, ME, USA, 1 August 2016.
- "Microbiological Methods for Cultural Heritage Conservation", NanotechItaly 2015, Bologna, 27 November 2015.
- "I microrganismi come biodeteriogeni delle opere d'arte", 43 Congresso Nazionale della Societá Italiana di Microbiologia - SIM 2015, Napoli, Italy, 30 September 2015.
- "Biocleaning of cultural heritage surfaces", European Conference of Biodeterioration of Stone Monuments, Universitè de Cergy-Pontoise, Cergy-Pontoise, France, 7 November 2014.
- "Use of Microbes in the Conservation and Restoration of Art Objects", Université De Neuchâtel, Neuchâtel, Switzerland, 20 January 2014.
- "Microbes on cultural heritage: enemies or friends?", Bern University, Bern, Switzerland, 12 December 2013.
- "Sperimentazione di biopulitura sull'affresco San Sebastiano, San Giovanni Battista e un devoto", Biorestauro, Vatican Museums, Vatican State City, 10 October 2013.
- "Il Biodeterioramento di polimeri sintetici", Tavola Rotonda "Il restauro e la conservazione di operee d'arte contemporanee", X Convention Ambiente Ricerca Giovani, Bergamo, 15-20 November 2009.
- "New environmental-friendly approaches against biodeterioration of outdoor cultural heritage", workshop "Biocolonization of Stone: Control and Preventive Measures", Museum Conservation Institute (MCI), Washington (US), 20-22 April 2009.
- "Fungal attack of natural and synthetic materials of cultural heritage", conference "The IUMS XIIth International Congress of Mycology", Istanbul (Turkey), 5-9 August 2008
- "Removal of undesirable compounds from stone and frescoes using bacteria", National Heritage Board of Sweden, Workshop "Removal of Damaging Conservation Treatments in Mural Paintings", , Österbybruk (Sweden), 2-3 November 2007.
- "Biopulitura di beni artistici con batteri", Progetto RESTAURO A SAN PIETROBURGO, organised by Istituto Nazionale per il Commercio Estero (ICE), ICE San Pietroburgo, and Istituto Internazionale del Marmo (ISIM), Museo Nevskij, San Pietroburgo (Russia), 3-5 September 2006.
- "Indagine microbiologica di alterazioni rosa presenti su materiale lapideo di interesse artistico", University of Trento, Potenzialitá della Citometria a flusso nell'analisi di matrici ambientali, Rovereto, 14 December 2004.
- "Il biodeterioramento di resine sintetiche usate in conservazione", Associazione Italiana di Scienza e Tecnologia delle Macromolecole, Commissione Ambiente e Beni Culturali, durante le giornate di studio "Polimeri e Beni Culturali", Florence, 4-5 June 2004.

8.5 Oral presentations (international conferences)

- "Biocleaning and study of biodeterioration of terracotta", in "Analisi e Conservazione delle Superfici in Cotto", Politecnico di Milano, Dipartimento di Architettura e Pianificazione, Milan. Workshop organised for the University of Nanjing, China, 4 February 2010.
- "Biodeterioramento di adesivi naturali e sintetici", in "Colore e Conservazione - Materiali e Metodi nel Restauro delle Opere Policrome Mobili", Milan, 21-22 November 2008.
- "Microorganisms attack synthetic polymers in cultural heritage", in "Conservation Science 2007", Milan, 10-11 May 2007.
- "Biotechnologies and Cultural Heritage", in "7th European Conference 'SAUVEUR', Safeguarded Cultural Heritage, Understanding & Viability for the Enlarged Europe", Prague, Czech Republic, 31 May-3 June 2006.
- "Biodeterioration and bioremediation of cultural heritage surfaces made of stone", in "Surface reactivity in minerals", Gargnano, Brescia, Italy, 10-11 April 2006.
- "Biotechnology and Cultural Heritage", in "Science, Technology and Cultural Heritage" workshop, Catania, Italy, 9-11 November 2005.
- "Conservation of biodeteriorated ancient documents and paper consolidation by plasma treatments" in "14th Triennial Meeting ICOM-CC", The Hague, The Netherlands, 12-16 September 2005.

- "Biotreatment of salts at Matera Cathedral", in "Heritage, Microbiology and Science", University of Portsmouth, Portsmouth, UK, 29 June-2 July 2005.
- "Bioconservation of the marble base of the Pietà Rondanini by Michelangelo Buonarroti", in "European Geosciences Union, General Assembly 2005", Vienna, Austria, 24-29 April 2005.
- "The EC project "Bioremediation for Building Restoration of the Urban Stone Heritage in European States (BIOBRUSH)", in "Air Pollution and Cultural Heritage An International Workshop", Siviglia, Spain, 1-3 December 2003.
- "Thermally assisted hydrolysis and methylation pyrolysis - gas chromatography / mass spectrometry for the chemical characterisation of traditional and synthetic binders" in 13th Triennial Meeting ICOM-CC, Rio de Janeiro, Brazil, 22-27 September 2002.
- "The chemical characterisation of alkyd resins by thermally assisted hydrolysis and methylation - gas chromatography / mass spectrometry and Fourier transform infrared spectroscopy", Conservation Science 2002, Edinburgh, UK, 22-24 May 2002.
- "An improved methodology for the chemical characterisation of alkyd-based paints", in "Gerry Hedley Student Symposium", University of Northumbria, NewCastle, UK, 2 June 2000.

8.6 Oral presentations (Italian conferences)

- "Valutazione del rischio microbiologico", in "Apparuit Thesaurus Ambrosius" organised by Basilica di Sant'Ambrogio, 30 November 2018, Basilica di Sant'Ambrogio, Milan.
- "Biorestauro: i batteri amici", in "La Biologia applicata ai beni culturali: dalla diagnostica all'intervento conservativo" organised by Centro Conservazione e Restauro La Venaria Reale, Venaria Reale (TO), 10 May 2013.
- "Pulitura di beni culturali con batteri", in "Verso un restauro compatibile con i processi naturali della materia" organised by Opificio delle Pietre Dure (Florence), held at Salone del Restauro, Ferrara, 31 March 2011.
- "Demetra e Cronos. Il caso studio delle statue del lapidario del Castello del Buonconsiglio", in "Le biotecnologie nella conservazione dei beni architettonici", Trento, 9 June 2006.
- "Biodeterioramento dei polimeri sintetici" e "Biorisanamento: tecniche di pulitura con enzimi e microorgasmi", in "Biotecnologie, Biologia e Nanotecnologie per la Conservazione dei Beni Culturali", Genova, 6 June 2006.
- "Potenzialità delle tecniche di biologia molecolare per lo studio di biodeteriogeni presenti nell'aria", in "XI Congresso Nazionale dell'Associazione Italiana di Aerobiologia", Parma, 5-8 April 2006.
- "Biotecnologie microbiche e restauro", in "Nano e Bio Tecnologie per il Restauro" workshop, Ferrara, 8 April 2005.
- "Biotecnologie microbiche per il recupero di opere d'arte deteriorate", in "Dal pest management al pest control", Florence, 1 October 2004.
- "Intervento di biorestauro sull'ara della Pietà Rondanini di Michelangelo", in "32esimo Congresso Nazionale Società Italiana di Microbiologia", Milan, 26-29 September 2004.
- "Progetto finanziato europeo "Bioremediation for building restoration of the urban stone heritage in European states (BIOBRUSH)", in "Biologia e Beni Culturali", Como, 22-23 September 2003.
- "Il biodeterioramento di resine sintetiche suate come leganti", in "Biologia e Beni Culturali", Como, 22-23 September 2003.
- "THM-GCMS and FTIR for the study of binding media in Yellow Islands by Jackson Pollock and Break Point by Fiona Banner", in "Ricerca Applicata ai Beni Culturali, la chimica, l'ambiente, la diagnostica, il restauro e la conservazione", Urbino, 3-4 October 2002.

Data	24 Giugno 2019	Luogo	Milano