CURRICULUM VITAE ET STUDIORUM

PROF. GIANLUIGI CARDINALI

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Personal Data

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Date of Birth	14 April 1964
	Married, five children

Education

2003	Stage on yeast molecular phylogeny at the Tennesse State University – Prof. Ganter
2001	Theoretical stage on yeast molecular phylogeny at the Tennesse State University – Prof. Ganter
1993-1995	Post Doctoral fellowship at the Heinrich Heine University of Düsseldorf with Prof. C.P. Hollenberg to study the galactose metabolism in *Saccharomyces cerevisiae* and *Kluyveromyces lactis*
1989-1993	Doctoral Degree at the University of Perugia in Fungal Biotechnology with a thesis on the molecular taxonomy of the *Saccharomyces sensu stricto* group
1992	Research stage at the University of California at Davis, California, USA with Dr. E.O. Shuster, on the phylogeny of *CDC28* and *CDC34* genes
1991	Stage at the Gulbenkian Institute,- Oeiras, Portugal, on the sugar transport in *Saccharomyces sensu stricto* group
1988	International Course on "Molecular Methods in Yeast Taxonomy" at the Gulbenkian Institute,- Oeiras, Portugal
1983-1988	Degree of Agricultural Engineer at the College of Agriculture of the University of Perugia – Thesis on the use of the protoplast fusion for yeast genetic improvement- *Summa cum Laude*
1987	Erasmus Grant at the Thames Polytechnic of London (currently University of Greewnich) on the aminoacidic composition of dihydroortase

Employment and positions

Since January 2020	Coordinator of the Doctorate in Biotechnology of the University of Perugia
Since December 2019	Co- Deputy Rector for the teaching
Since Dec. 2nd, 2019	Full Professor at the University of Perugia
Dic 2014	National Scientific Habilitation as Full Professor

Since 2014	Associate Professor at the Department of Pharmaceutical Sciences of the University of Perugia
Since 2013	Member of the Doctorate school in Biotechnology
2012-2013	Member of the Doctorate School in Biochemical and Biotechnological Sciences
Since 2011	Affiliated to the Excellence Research Center CEMIN
Since 2004	Associate Professor at the Department of Applied Biology of the University of Perugia and member of the College of Agriculture
2002	Habilitation as Associate Professor
2004-2012	Member of the Doctorate school in Plant Biology and Biotechnology
1995-2003	Member of the Doctorate school in Fungal Biotechnology
1994-2004	Assistant Professor at the Department of Applied Biology of the University of Perugia and member of the College of Agriculture
1993	Technical Assistant at the Heinrich Heine Universitaet – Duesseldorf - (D)

Appointments and Public Engagement

2024-2028	Member and Secretary of the Bioethics Committee of the University of Perugia
Since 2022	Comitato tecnico-scientifico per la valutazione delle domande di iscrizione nel Registro Regionale per la tutela del patrimonio genetico di interesse agrario a rischio di erosione genetica - Region Umbria - **Member of the board**.
Since July 2023	Coordinator of the group "Microbiology" within the Technical Scientific committee of the Ministry of Agriculture for the protection of the Biodiversity of Agricultural Interest.
Since 15.3.2021	Member of the Technical Scientific committee of the Ministry of Agriculture for microbial diversity protection
2020-2023	Member of the Bioethics Committee of the University of Perugia
Since Dec. 2019	Member of the Observatory for teaching at UNIPG, aid of the Rector delegate
2018-2021	Comitato tecnico-scientifico per la valutazione delle domande di iscrizione nel Registro Regionale per la tutela del patrimonio genetico di interesse agrario a rischio di erosione genetica - Region Umbria - **Member of the board**.
2017-2020	Scientific Commette of Fondazione Scienza e Fede. Holy See, Pontifical Council of Culture - **Member**
2017-2019	**Responsible for the Quality** of the Department of Pharmaceutical Sciences. DSF -
Since 2014	Steering Board of the Dep. Pharmaceutical Sciences- **member**
Since 2015	Technical Scientific Board of the ITS (Higher College of Technology) Biotechnologies. ITS Umbria - **President**
Since 2015	Expert evaluator for the Council for Agricultural Research and Economics (CREA)
2010-2014	STOQ project agreement between the University of Perugia and the Pontifical Council for Culture. UNIPG- The Holy See - **Local responsible**
2013-2016	Scientific Commette of Fondazione Scienza e Fede. Holy See, Pontifical Council of Culture - **Member**.

2011	Commission of genetic resources for Food and Agriculture. FAO - **Expert**.
2011-2015	Bioethical Board of the University of Perugia. UNIPG - **Vice president**.
2010-2012	Italian Society of Food, Agricultural and Environmental Microbiology. SIMTREA - **Secretary**
2009-2012	Working group for the Italian guidelines for the conservation and exploitation of the biodiversity of agricultural interest (GIBA). MiPAF - **Coordinator**
2008	Italian Ministry of Agriculture (MiPAF) for the Organic Yeast definition - Bruxelles, July 10-11 2008. MiPAF - **Expert**
2007-2008	Expert panel on the organic wine at the Italian Ministry of Agriculture (MiPAF). MiPAF - **Member**.

Publications for governative organizations

2015	Beed, F., A. Benedetti, G. Cardinali, S. Chakraborty, T. Dubois, K. Garrett and M. Halewood (2015). *Micro-organism genetic resources for food and agriculture and climate change. Coping with climate change* – the roles of genetic resources for food and agriculture. F. staff. Rome, **FAO**.
2012	Cardinali, G. and A. Benedetti (2012). *Linee guida per la conservazione e caratterizzazione della biodiversita' microbica di interesse agricolo*. Rome **MiPAF**.
2011	Beed, F., A. Benedetti, G. Cardinali, S. Chakraborty, T. Dubois, K. Garrett and M. Halewood (2011). "*Climate change and micro-organism genetic resources for food and agriculture: state of knowledge, risks and opportunities.*" Commission on Genetic Resources for Food and Agriculture.
	Background Study Paper

Memberships

American Society for Microbiology (ASM)

Italian Society of Agricultural, Food and Environmental Microbiology (SIMTREA)
Italian Genetical Association (AGI)
Italian Wine Group

Awards

2017	Gilead Fellowship prize for Digital research Project
2017	Premio SIMTREA per la miglior pubblicazione Scientifica dell'anno (Impact factor= 13). Società Italiana di Microbiologia Agraria Alimentare e Ambientale -.
2016	Gilead Fellowship prize for Invasive Fungal Infection Project : Caratterizzazione del biofilm ed efficacia del trattamento con Amfotericina B liposomiale in ceppi filmogeni del gruppo *Candida parapsilosis sensu lato*

Grants and Projects

2022-2023	Regional Project "Uso dei *Bdellovibrio* and like bacteria (BALOs) per il contenimento dei batteri patogeni dei germogli e dei semi da germoglio in produzione biologica: applicazione industriale e proposta di un paradigma innovativo" CUP I99J20003690008 – Scientific Coordinator
2021-2023	MiSE Project – PRO-BIOETICA – Coordinator of the RU
2020-2022	EU Project Cosy Thinking - member
2019	Ricerca di Base effetto di polifenoli da acque di vegetazione (pow) e da foglie di olivo (pol) nella riduzione della crescita e dello sviluppo del biofilm di lieviti opportunisti.
2018-20	"Complex Regional Project" on the valorization of waste products: a. Part 1 . Ditta Bavicchi: Evaluation of innovative polyphenolic compounds in protecting seeds and seed production b. Part 2. Ditta Mignini : Evaluation of Multi-Drug resistance and microbiome in poultry and rabbit industrial productions.
2018	Regional Project "ARCO": Distribution of epiphitic microbiota of seeds of agricultural and food interest
2018	Ricerca Base 2018. MIUR - **Investigator**.
2017-18	Sviluppo di una applicazione di intelligenza artificiale per supporto alla decisione clinica in corso di candidemia o sospetta candidiasi invasiva –Gilead Digital- **Co-proponente**
2017-2018	Biofilms: a correlative study. INFN DAFNE BEAMLINE - Project N°21. **Responsible of the Project**.
2016-2017	Sistema in house microbiologico e metagenomico avanzato per il controllo dei microrganismi nelle produzioni di germogli e semi da germoglio. Regione Umbria - **Responsible of the Project**.
2017-18	FTIR spectroscopy and imaging of *Candida albicans* biofilm.(CALBIOFTIR). INFN-LNF DAFNE-Light Facility - Project N°9 SINBAD. **Responsible of the Project**.
2016-2018	Caratterizzazione del biofilm ed efficacia del trattamento con Amfotericina B liposomiale in ceppi filmogeni del gruppo *Candida parapsilosis sensu lato* Gilead Fellowship. **Responsible of the Project**.
2014-2018	Yeasts for the Sustainability in Viticulture and Oenology.(YesVitE). EU Fp-7 People - IRSES MSCA - 7PQ N.PIRSES-GA-2013-612441. **Responsible of RU**.
2014-2016	Caratterizzazione della variabilità del microbiota in germogli. Regione Umbria - Legge Reg 598. **Responsible of the Scientific Project**.
2013-2014	Aggiunta di ceppi autoctoni di *Debaryomyces hansenii* ai salumi umbri per il miglioramento qualitativo come Selezione Partecipativa microbiologica. Fondazione Cassa di Risparmio di Perugia - FCR-2013. **Responsible of the Project**.
1.2.2013 1.2.2016	Microrganismi negli alimenti e nell'uomo: studio del microbiota e del relativo metaboloma in funzione della dieta omnivora, vegetariana o vegana. MIUR - PRIN 2010. **Responsible of the RU**.
2012-2016	Bioraffineria di terza generazione Integrata nel territorio MIUR - CLUSTER – CHIMICA VERDE 2012 **Responsible of OU**.

2010	Sistema di sterilizzazione microbiologica di semi con sistemi per agricoltura biologica. Regione Umbria - Legge 598 – 2010. **Scientific Coordinator**.
2009-2012	Lieviti autoctoni per l'innovazione di prodotto nel settore vitivinicolo regionale Regione dell'Umbria - PSR – Umbria 2009 **Member of RU**.
2008	Tirocinio sulla biodiversità fungina nei suoli in via di desertificazione - Gianfranco Puddu. Regione Sardegna - Master and Back –2008. **Scientific Coordinator and Tutor**.
2008-2011	Marcatori di qualità del suolo utili al controllo dei processi produttivi in biologico.(MARKER IN BIO). MiPAF - Ricerca 2008. **Responsible of the Research Unit**.
2008-2011	Innocuità ed efficienza di proteine idrolizzate per la concimazione azotata in agricoltura biologica (PROIDRO). MiPAF - Ricerca 2008. **Responsible of RU**.
2008-2009	Biocidi naturali per la sicurezza e la salute. POR Umbria - FSE 2007-2013 Ob. 2 Sviluppo delle risorse umane nell'ambito di reti di imprese, di singole imprese e di singole imprese innovative. **Coordinator of the Project**.
2007-2009	Biomonitoraggio avanzato e biodegradaziomne di residui di fitofarmaci e loro metaboliti Fondazione Cassa di Risparmio Perugia 2007 - FCR 2007. **Scientific Coordinator**.
2006-2010	Ruolo dei biofilm microbici per la qualità e la sicurezza dei prodotti caseari. MiUR - FIRB Idee Progettuali 2006. **Responsible of RU**.
2005-2007	Proposta per un sistema certo di tracciabilità per il controllo e la protezione delle carni - Renewed. MiPAF - Tracciabilità -Tormancina. **Responsible of the Research**.
2004-2007	Rintracciabilità genetico-microbiologico-molecolare delle pomacee. MiPAF - MiPAF Ricerca 2004. **National Coordinator**.
2003-2005	Rintracciabilità Microbiologico-Molecolare dei Formaggi - (RINFOR). MiPAF - Progetto a Sportello – 2003. **Responsible of RU**.
2003-2005	Prevenzione sanitaria mediante monitoraggio e risanamento degli ambienti inquinati".(FCR 2003). Fondazione Cassa di Risparmio di Perugia - Cod. progetto 2003.0071.020 SALUTE PUBBLICA. **Scientific Responsible**.
2002-2004	Proposta per un sistema certo di tracciabilità per il controllo e la protezione delle carni. MiPAF - Tracciabilità -Tormancina. **Responsible of the Research**.
2001-2003	Prevenzione sanitaria mediante monitoraggio e studio degli effetti degli inquinanti ambientali su organismi modello viventi. Fondazione Cassa di Risparmio di Perugia - FCR 2001. **Responsible of RU**.

International Cooperative agreements

2019-2023	General doctoral agreement between the University of Perugia and the University of Aas (Norway). - **Member**.
2015-2017	Co-tutorship agreement between the University of Perugia and the University of Aas (Norway). - **Scientific Responsible - proposer**.
2010-2014	STOQ project agreement between the University of Perugia and the Pontifical Council for the Culture. UNIPG- The Holy See - **Local responsible**

2009-2012	Committee on the teaching of the Agricultural Microbiology. SIMTREA - **Coordinator**.
2001-2004	Cooperative agreement between Tennessee State University and Università degli Studi di Perugia. UNIPG- TSU - **Coordinator & proponent**.

Editorial activity

Since 2018	Annals of Applied Microbiology & Biotechnology – **Editor**
Since 2018	Journal Microorganisms – **Editor**
2015	Proceedings of the MD2015 International meeting – **Editor**
2009-2012	The Open Applied Bioinformatics Journal - **Member of the editorial board**
2011	Special issue on the bioinformatics applied to fungal taxonomy. **Editor**

Meeting Organizations

2019	IV International Conference on Microbial Diversity – Catania (MD2019). SIMTREA - **Program Committee**.
2017	IV International Conference on Microbial Diversity - Bari.(MD2017). SIMTREA - **Scientific Committee**.
2015	III International Conference on Microbial Diversity - The Challange of Diversity - Perugia.(MD2015). SIMTREA - **Chair of the conference**
2011	I International Conference on Microbial Diversity - Milan.(MD2011). SIMTREA - **Organizing Committee**.

Teaching

1999-2002	Applied Microbiology – DU Food Technology
2000-2005	Microbial Genetics – Master in Agricultural Science and Technology
2003-2005	Agricultural Microbiology - CLT Viticulture & Enology
2004-2010.	Agricultural Microbiology and Microbial Biotechnologies – CL Biotecnologie
2004-2009	Microbiological Techniques – CL Biotecnologie
2005-2010	Microbiological Biotechnologies – CLS Biotecnologie Farmaceutiche
2010-2017	Microbial Genetics and Biotechnologies - CI Microbiologia – CLT Biotecnologie
Since 2018	Laboratories of Microbial and Cell Cultures Models - CLT Biotecnologie
Since 2018	Food Microbiology – CL Science of the human food and nutrition (SANU)
2009-2015 then since 2018	General Microbiology – CLT Food Science and Technology - Università degli Studi di Perugia

Since 2005	Agricultural Microbiology – CLT Scienze Agrarie e Ambientali

Outreach & Citizen Science

2019	21.11.2019 ApeRicerca 2019 – L'Universo sconosciuto dei Microrganismi
2018	La Rivoluzione dei Big Data per lo scienziato e per tutti noi. Open Day of the Winter School on Biotechnology - Unipg - **Chair**.
2017	25.5 . Microrganismi, Amici o nemici? UniPG - Scienza Infusa - **representative of the Department of Pharmaceutical Sciences.**
2015	La salvaguardia della bio-diversità microbica. I. Convegno Interdipartimentale: Confronti Sulla Bioetica - Unipg - **invited lecturer.**
2009	La specie microbica fra concezione e applicazione. Darwin tra Scienza Storia e Società - Chieti - **invited lecturer**.
30.6 -5.7 2008	The microbial Species: concepts and applications. STOQ Project - Summer school on Evolution - Poblet - (E) - **invited lecturer**.

Technological Transfer

2013-2018	"Enzyme & Cell Biosolutions" (ECB) spin-off . - **Co-founder**.
2018	"Enzyme & Cell Biosolutions" (ECB) spin-off . - **Price for the best plan**.
2007-2010	"MITES" Spin-off on the use of microbial derivatives for material traceability. UniPG - **Founder**
2006	EPO - Materiali plastici informativi decodificabili (MPID) . 06425232.3, INSTM-MITES-. EPO
2006	Prized as the best "spin off" project at the UniPG StartCup

Research Evaluations

2006	Evaluation CIVR: **Best** publication of the Scientific Area 07 of the University of Perugia
2004-2010	Evaluation ANVUR: 3 **Excellent** papers out of the 3 papers requested
2011-2014	Evaluation ANVUR: 2 **Excellent** papers out of the 2 papers requested

Research Metrics

H- index	**22** (Scopus); **21** (WoS); **24** (Google Scholar)
H index last 15 years	**18** (Scopus)
Citations	**3718**(Scopus); **5021** (Google Scholar)
Citations last 10 years	**2997** (Scopus)

Number of publications	**93** printed with IF**; 103** total communications, of which **14** invited talks
Number of publications last 10 years	**63** printed with IF since 2010, of which **57** according to Scopus
Impact factor	Total IF score **= 287,5** average IF score **= 3.16**
Metrics for ASN Commissioners	Satisfied (> 2/3 metrics) for **AGR/16** and **BIO/19**
Publications	List available form http://www.unipg.it/personale/gianluigi.cardinali

Research Lines

Introduction to the research lines

The original focus of the research was on yeast taxonomy in a period (1990-1998) in which the classical taxonomy was moving to the promiscuous use of molecular tools, still maintaining the general framework based on dichotomic keys, morphology and physiological traits for the species description and delimitation. In this scenario, there was an active search of additional traits to improve the species description. This situation called for a large number of explorative activities, that were sometimes maintained for their intrinsic interest. In this view, the research lines in Bioinformatics, molecular biology, FTIR metabolomics and physiology are all spin-offs deriving from that original activity. The search for biocides and the interest for the microbial biofilm were mostly fostered by the realization of the huge possibilities given by the metabolomics, that were far beyond the original interest as a taxonomic tool. Even the yeast genetics is part of this general view, due to the belief that a sound taxonomic and phylogenetic analysis cannot forget that microbes have quite different genetic structures that determine their plasticity and their evolutive traits. Most of the models for genetics and phylogenetics derived from food and hence a continuous interest in food microbiology, as a field that can take advantage by improved taxonomic and genetic understanding of some of its players.

Yeast Phylogenetics and Taxonomy. This line of research was started with the PhD project and carried out since then with different approaches and technologies, following the continuous update in fungal and particularly yeast taxonomy and systematics. The attempt to define species with electro-karyotyping as a new alternative to original DNA/DNA hybridization, was able to show the presence of intra-specific hybrids, well before (1993) they were confirmed with more powerful techniques and Genome sequence analysis. The analysis of banding pattern-based techniques led to produce original software applications to decrease the level of subjectivity inherent in the assignment of molecular weights to bands. Following the introduction of sequencing as a primary taxonomic too, the line of research was moved to the individuation and optimization of marker genes. This led to long term wide community projects for the development of two internationally recognized barcode markers (ITS and TEF1-alpha). Currently, the interest has been moved to the possibility of application of innovative NGS techniques to multiple barcode sequencing, in order to increase the reliability of the molecular analyses and their rapidity and reproducibility. Parallel to the development of new molecular tools the Fourier Transform InfraRed (FTIR) technique has been used to assess the extent of metabolomic differences within and between species. The

current effort is to put at work together phenotypic techniques such as FTIR and MALDI TOF with the most advanced and molecular Next Generation Seq approaches, considering the latter both at the level of single genes and of genomes for a reproducible, accurate and fast diagnosis at the species level. During the development of the above mentioned researches, within this research line, there was an obvious interest on the definition of the species concept, leading to deepen the epistemology concerning this long debated question. This has brought about the participation to transversal initiatives, such as the school on Evolution at Poblet (see list of titles) and later the invitation to join the scientific board of the STOQ Foundation. (Publications n. 4, 8, 9, 16, 17,19, 25, 27, 29, 35, 38, 39, 46, 52, 68, 71, 72, 74, 77, 78, 84, 85, 90, 92, 93)

Fungal ecology and systematics. Several species have been isolated and described from various sources such as cacti, olive oil, soil etc. Particular care has been given to the assessment of the stability of key phenotypic characters, such as the ability to produce spores, which is essential to gain knowledge in the assessment of the presence, extent and type of sexuality of the newly isolated species. This line is still operative and some new papers describing new species are under preparation. A spin-off of this research line is that involving the study of the gut microbiome of man and production animals subject to different diets. This line of research has been originally focused on the human gut microbiome. It is currently under development for the gut microbiome of production animal species such as chicken, rabbit and swine. The focus of this new research lines is focused on the effect of diet, additives and other conditions on the microbiomes, with a special emphasis on the effect exerted against pathogenic and opportunistic species, especially those exhibiting large amounts of multi drug resistant strains. (publication n. 4, 10, 28, 30, 49, 50, 55, 56, 57, 61, 67, 69, 74)

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Food Microbiology, has been one of the focuses since the early researches focused on the *Saccaromyces sensu stricto* group. This area of interest has been studied from different points of view, including the preservation and valorization of the biodiversity, the trait distribution within populations and definition of typical areas of production. This has led to projects and publications aiming at ensuring a direct method of traceability based on the intrinsic characteristics of the products, in order to better define their typical traits. (publication n. 4, 30, 36, 40, 47, 48, 53, 57, 59, 62, 65, 68)

3

Bioinformatics – This line of Research was developed over the time to give a technical support to the lines of research regarding phylogenetics and taxonomy with applications based on innovative approaches. this line of research includes the production of applications as Excel Macro and then as scripts in the free environment R, some of which described in technical peer-reviewed journal (reported among the publications "peer reviewed non ISI). In the last years, this line moved to the development of new algorithms for massive data analysis, bioinformatics applied to taxonomy and phylogeny in the current perspective of NGS produced sequences that present problems in terms of length (Illumina platform), error rate (Oxford Nanopore) and in general of amount of not dereplicated reads. The current aim is the construction of a comprehensive workflow able to integrate existing and new software applications in different

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languages to swiftly produce pipelines in metagenomics and genomics, with a particular attention to the taxonomic reliability of the assignments at the species or higher ranking levels (Publication n. 8, 17, 19, 29, 35, 39, 46, 52, 76, 79, 88)

Yeast Classical Genetics and Molecular Biology – In this line of research are included classical genetics works to select yeast strains able to ferment at super-optimal temperature and other studies to improve the resistance of oenological strains to the active drying. The production of holo-homozygous and their subsequent selection has led to a set of oenological starters tested in the Regional Project on Autochthonous wine starters. This line of research is currently under development to produce yeast culture for the wine and the fermentation industry, offering new fermentation profiles. For instance, a series of strains has been developed and characterize to decrease the fermentation speed, and consequently the production of heat, and the alcohol/sugar ratio, in order to reduce the alcohol content. This still unpublished work includes the comparison of the genomes, in order to link the presence of specific traits with the new organization of the genomes in comparison to the parental strain from which the research programme stemmed. Furthermore, this line includes papers on the yeast molecular biology focused on the regulation of the GAL/LAC gene regulation, on the *HXT* genes and a series of papers to establish new methods in yeast molecular biology. (Publications n. 75,81, 82, 86, 87, 89, 91, 92, 93)

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Fourier Transform InfraRed Spectroscopy - FTIR Metabolomics – This line, developed since 2005, was originally intended as a tool for the rapid identification of yeasts at the species level, and is therefore entangled with the research line 1. It was later developed to includes three subdirectories: a) detection and quantification of mixed cultures by means of FTIR, b) Metabolomic characterization at the strain and population level, c) dereplication and definition of the population clonality. This last line of research is currently under intensive development, with the help of an innovative R based software, written ad hoc and not yet published, aiming at defining the statistically significant spectroscopic bands employed to differentiate strains in a reliable, rapid and reproducible manner. Furthermore, this activity is probably mandatory in ex situ biodiversity conservation projects, in order to avoid the inclusion of several replicates in the same collection or the recourse to more expensive molecular techniques. (Publication n. 16, 23, 33, 37, 43, 58, 60, 63, 64)

6

Physiology and stress response in yeast and bacteria. After early works on the physiology of yeasts and particularly on the catabolism of *Saccharomyces sensu stricto* strains. Later, this line moved to the determination of the physiological status of the cells and aiming at finding novel biocidal products. Hence this line of research was developed to determine the level of stress of microbial cells subject to different physical or chemical treatments. The line of research includes the definition of the spectral areas responding to the stress, the classification of the strains on the basis of the metabolomics stress response and of the cell mortality and the definition of the different modes that strains of the same species use to cope with stressing conditions. The inherent advantage of this approach is the analysis of the whole metabolome, whereas the limitation is the difficulty to define the metabolite involved, since the techniques refers to functional groups or to

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compound classes. In order to overcome this problem, a spin-off of this line of research has been started to analyze the cell extracts with high resolution liquid chromatography followed by Mass Spectroscopy. (Publication n. 3, 20, 31, 41, 42, 45, 54, 63, 66, 70, 80, 87)

Microbial Biofilm, monitoring and control. This line of research started from the observation that abiotic surfaces in food microbiology industry were colonized by several fungi and bacteria, often together. An additional interest on this field originated by the observation that some yeast opportunistic species, e.g. *Candida parapsilosis*, are increasingly present in both the food and hospital environment. These observations led to the comparative study of the biofilm characteristics of strains from various environment and to the determination of models to define the importance of the biofilm in challenging environments. The availability of strains mostly of nosocomial origin, has led to study their characteristics at different levels and with different techniques, including classical microbiology, NGS, MALDI TOF, FTIR and RAMAN spectroscopy. The necessity of quantitative measures of the biofilm present of a surface led to the definition of new determination techniques for the biomass and activity evaluation. Finally, the resistance of the yeast biofilm to different stressing agents and drugs in different moments of its maturation are currently under study. (Publication n. 1, 2, 5, 6, 11, 12, 13, 15, 21, 26)

Publications

A. ISI- SCOPUS Indexed

1. Donati, L., D. Casagrande Pierantoni, A. Conti, E. Calzoni, L. Corte, C. Santi, O. Rosati, **G. Cardinali** and C. Emiliani (2024). "Water Extracts from Industrial Hemp Waste Inhibit the Adhesion and Development of *Candida* Biofilm and Showed Antioxidant Activity on HT-29 Colon Cancer Cells." Int J Mol Sci 25(7).

2. Catto C, Corte L, Roscini L, **Cardinali G**, Villa F, Cappitelli F. 2022. Metabolomic and Proteomic Changes in Candida albicans Biofilm in Response to Zosteric Acid Treatment. Int J Mol Sci 23

3. Conti A, Casagrande Pierantoni D, Robert V, Corte L, **Cardinali G**. 2023. MinION Sequencing of Yeast Mock Communities To Assess the Effect of Databases and ITS-LSU Markers on the Reliability of Metabarcoding Analysis. Microbiology Spectrum 11:e01052-22

4. Donnadio A, Roscini L, Di Michele A, Corazzini V, **Cardinali G**, Ambrogi V. 2021. PVC grafted zinc oxide nanoparticles as an inhospitable surface to microbes. Materials Science and Engineering: C 128

5. Gupte AP, Pierantoni DC, Conti A, Donati L, Basaglia M and **Cardinali G**. 2023. Renewing Lost Genetic Variability with a Classical Yeast Genetics Approach. Journal of Fungi 9

6. Lücking R, Aime MC, Robbertse B, Miller AN, Aoki T, et al. and **Cardinali G**. 2021. Fungal taxonomy and sequence-based nomenclature. Nature Microbiology 6:540-8

7. Pieralisi S, Canonico C, Di Lullo S, Angelico G, Cardinali G, et al, and **Cardinali G**. 2023. Effectiveness of *Bdellovibrio bacteriovorus* to contain Escherichia coli on milk and temperature impact on predation dynamics. Italian Journal of Food Science 35:80-7

8. Romano P, Siesto G, Capece A, Pietrafesa R, Lanciotti R, et al. and **Cardinali G**. 2022. Validation of a Standard Protocol to Assess the Fermentative and Chemical Properties of Saccharomyces cerevisiae Wine Strains. Frontiers in Microbiology 13

9. Yurkov A, Alves A, Bai FY, Boundy-Mills K, Buzzini P, et al. and **Cardinali G**. 2021. Nomenclatural issues concerning cultured yeasts and other fungi: why it is important to avoid unneeded name changes. IMA Fungus 12:1-18

10. Crous PW, Lombard L, Sandoval-Denis M, Seifert KA, Schroers HJ, **Cardinali G**. et al. 2021. *Fusarium*: more than a node or a foot-shaped basal cell. *Stud Mycol* 98:100116

11. Donnadio A, Roscini L, Di Michele A, Corazzini V, **Cardinali G**, Ambrogi V. 2021. PVC grafted zinc oxide nanoparticles as an inhospitable surface to microbes. *Materials Science and Engineering*: *C*. 128 -112290

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