

Laura Bruno

Research interests:

Characterization of epilithic cyanobacterial strains and biofilms deteriorating cultural heritages in indoor and outdoor environments, systematics and phylogeny.

Selection and characterization of cyanobacteria and microalgae for biotechnological applications in the fields of energy, environment, nutraceutical and nanotechnologies

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Laura Bruno is research scientist in General Botany at the Laboratory of Biology of Algae (LBA) at the Department of Biology of the University of Rome "Tor Vergata". Since 2012 she is the responsible of the LBA. In 2017 obtained the National Scientific Qualification at the level of Associate Professor in Botany.

She obtained the Ph.D. in Evolution Biology and Ecology in 2004 by studies on the biodiversity and ecology of filamentous cyanobacteria isolated from photosynthetic biofilms present in Roman hypogea and the degree title in Biological Sciences in 1995 with honours.

Since 2008 she has been teaching Systematic of Phytobenthos, Plant evolution, Botany, Plant biotechnology applied to the Cultural Heritage. She is supervisor of BS, MS and PhD and Erasmus students; reviewer of grant proposals for national and international universities and research centres.

Current scientific activity

-Characterization of epilithic cyanobacterial strains and biofilms biodeteriorating cultural heritages in indoor and outdoor environments, acclimation and adaptation to different light conditions, systematics and phylogeny.
-Development of non-invasive and non-destructive techniques against biological colonization as conservation strategies of Cultural Heritages.

-Selection and characterization of cyanobacteria and microalgae as potential producers of biodiesel and other valuable compounds; optimization of culture conditions in order to improve the production of biomass and lipid content; biotechnological applications of microalgal biomass in the field of energy, environment, nutraceutical and nanotechnologies; diatom frustule photonics for random lasing and dye trapping applications.

-Studies for microalgae application for the bioremediation of wastewaters by removal of nitrogen, phosphorous and heavy metals

Responsibility in national and international projects

She is the responsible (PI) of the project of Lazio Region: 'Progetti di Gruppi di Ricerca – Agrifood - Conoscenza e cooperazione per un nuovo modello di sviluppo' 2018-2021; the responsible of OU in the project POR FESR LAZIO 2014-2020; PI of the project Mission Sustainability 2017, Univ. Roma Tor Vergata; she is the responsible of the OU of Roma Tor Vergata in the project PRIN2015 of the Italian Ministry of University and Research; one of the principal investigator in the project 'PHANTOM – PHotonics ApplicationN in diaTOM frustules' (Uncovering Excellence 2014, University of Rome 'Tor Vergata' Grant); the coordinator of the Scientific International Collaboration between University of Rome "Tor Vergata" and Fakin Mohan University, (India) in the fields 'Biotechnology and nanotechnology for Cultural Heritage'. Moreover, she was the scientific responsible of the Italian project for the transfer of knowledge from research centers to SMEs: 'DICO-BEN, Diodes for the control of Cultural Heritage, the Scientific responsible of the Unit Roma 2 in the frame of the project 'Technologies for the production of biofuels from plant biomasses' between Italian Universities CUIA (Consorzio Universitario Italiano per l'Argentina) and Argentine Universities (Patagonia, Sur) and member of the OU of the Engineering Department of University of Rome 'Tor Vergata' in the Italian

project 'Utilization of last generation biofuels in diesel engines' (Italian Ministry of University and Research-MIUR2009) and responsible of the biological aspects of the project.

Knowledge transfer: since 2009 to present she is the promoter and Member of Board Directors of the University Spinoff AlgaRes srl.

Publications (2014-2019):

1. Rugnini L, Ellwood NTW, Costa G, Falsetti A, Congestri R, **Bruno L** (2019) Scaling-up of wastewater bioremediation by *Tetradasmus obliquus*, sequential bio-treatments of nutrients and metals. *Ecotoxicology and Environmental Safety*, 172:59-64; s2.0-85060253465
2. Urzì C, **Bruno L**, De Leo F (2018). Biodeterioration of paintings in caves, catacombs and other hypogean sites. In: Mitchell R, Clifford J (eds) *Biodeterioration and preservation in Art, Archaeology and Architecture*. Archetype Publications Ltd, London. Pag. 114-129. ISBN 978-1-909492-64-6
3. Fontanini D, Andreucci A, Ruffini Castiglione M, Basile A, Sorbo S, Petraglia A, Degola F, Bellini E, **Bruno L**, Varotto C, Sanità di Toppi L (2018). The phytochelatin synthase from *Nitella mucronata* (Charophyta) plays a role in the homeostatic control of iron(II)/(III). *Plant Physiology and Biochemistry* 127: 88-96 <https://doi.org/10.1016/j.plaphy.2018.03.014> SC s2.0-85043987239
4. **Bruno L**, Valle V, Gismondi A, Di Marco G, Canini A (2018) Applicazione di oli essenziali come metodo non-invasivo per il controllo del biodeterioramento di beni culturali in pietra. *Notiziario della Società Botanica Italiana* 2: 6-7.
5. L. Rugnini, G. Costa, R. Congestri, S. Antonaroli, L. Sanità di Toppi, **L. Bruno** 2018. Phosphorus and metal removal combined with lipid production by the green microalga *Desmodesmus* sp.: An integrated approach. *Plant Physiology and Biochemistry* 125:45-51. doi.org/10.1016/j.plaphy.2018.01.032 s2.0-85041693351
6. **Bruno L**, Valle V (2017). Effect of white and monochromatic lights on cyanobacteria and biofilms from Roman Catacombs. *International Biodeterioration & Biodegradation* 123:286-295 DOI 10.1016/j.ibiod.2017.07.013 s2.0-85026357963
7. L. Rugnini, G. Costa, R. Congestri, **L. Bruno** 2017 Testing of two different strains of green microalgae for Cu and Ni removal from aqueous media. *Science of Total Environment*, (601-602), 959–967. <http://dx.doi.org/10.1016/j.scitotenv.2017.05.222> s2.0-85019995551
8. Ruffolo SA, De Leo F, Ricca M, Arcudi A, Silvestri C, **Bruno L**, Urzì C, La Russa MF 2017 Medium-term in situ experiment by using organic biocides and titanium dioxide for the mitigation of microbial colonization on stone surfaces. *International Biodeterioration and Biodegradation*, 123: 17-26.
9. Etemadi-Khah Atefeh, Ahmad Ali Pourbabaee, Mostafa Noroozi, Hossein Ali Alikhani & **Laura Bruno** 2017 Biodiversity of isolated cyanobacteria from desert soils in Iran. *Geomicrobiology Journal* 34 (9): 784-794. <http://dx.doi.org/10.1080/01490451.2016.1271064>
10. Gouveia L, Oliveira AC, Congestri R, **Bruno L**, Soares AT, Menezes RS, Filho NRA, Tzovenis I 2017. Biodiesel from microalgae. In: L Gouveia, R Muñoz, C González (eds.) 'Microalgae-Based Biofuels and Bioproducts' Elsevier, Woodhead Publishing, 235-258 ISBN: 978-0-08-101023-5 s2.0-85032159035 Doi 10.1016/B978-0-08-101023-5.00010-8
11. De Matteis F, Proposito P, Francini R, De Angelis R, Mochi F, Melino S, Congestri R, **Bruno L**, Casalboni M 2017. Photonic application of diatom frustules. *Materials Science Forum*, 879: 419-423
12. De Angelis R, Melino S, Proposito P, Casalboni M, Lamastra FR, Nanni F, **Bruno L**, Congestri R 2016. The diatom *Staurosirella pinnata* for photoactive material production. *PLOS ONE* 11(11): E0165571. DOI:10.1371/journal.pone.0165571
13. Urzi C, De Leo F, Krakova L, Pangallo D, **Bruno L** 2016. Effects of biocide treatments on the biofilm community in Domitilla's catacombs in Rome. *Science of Total Environment*. Volume 572, 1 December 2016, Pages 252–262 <https://doi.org/10.1016/j.scitotenv.2016.07.195>
14. Gismondi A, Di Pippo F, **Bruno L**, Antonaroli S, Congestri R (2016): Phosphorus removal coupled to bioenergy production by three cyanobacterial isolates in a biofilm dynamic growth system, *International Journal of Phytoremediation*, 18(9) 869-876, DOI: 10.1080/15226514.2016.1156640 WOS:000377993600004
15. Federica Marano, Federico Di Rita, Maria Rita Palombo, Neil T.W. Ellwood, **Laura Bruno** (2016). A first report of biodeterioration caused by cyanobacterial biofilms of exposed fossil bones: a case study of the Middle Pleistocene site of La Polledrara di Ceanibbio (Rome, Italy). *International Biodeterioration & Biodegradation*, 106: 67-74. DOI 10.1016/j.ibiod.2015.10.004

16. L. Krakova, F. De Leo, **L. Bruno**, D. Pangallo and C. Urzì. 2015. Complex bacterial diversity in the white biofilms of St. Callistus Catacombs in Rome evidenced by different investigation strategies. *Environmental Microbiology* 17 (5):1738-1752. DOI: 10.1111/1462-2920.12626 s2.0-84958747738
17. **Bruno L**, Ficorella I, Valentini F, Quici L, Keshari N, Adhikary SP. 2014. Characterization of phototrophic biofilms deteriorating Indian stone monuments, their response to heat stress and development of a non-invasive remediation strategy. In: M.A. Rogerio-Candelera (ed). *Science, Technology and Cultural Heritage*. CRC Press/Balkema, The Netherlands, pp.205-210, ISBN 978-1-138-02744-2
18. Hsieh P, Pedersen JZ, **Bruno L**. 2014 Photoinhibition of Cyanobacteria and its Application in Cultural Heritage Conservation. *Photochemistry and Photobiology*,90:533-543.
19. **Bruno L**, Bellezza S, De Leo F, Urzi C. 2014. A study for monitoring and conservation in the Roman Catacombs of St. Callistus and Domitilla, Rome (Italy). In Saiz-Jimenez C. (Ed.), *The Conservation of Subterranean Cultural Heritage*. CRC Press, Taylor & Francis Group, pp. 37-44, ISBN 978-1-138-02694-0; 10.1201/b17570-6
20. **Bruno L**, Quici L, Ficorella I, Valentini F. 2014. NanoGraphene Oxide: a new material for a non-invasive and non-destructive strategy to remove biofilms from rock surfaces. In Saiz-Jimenez C. (Ed.), *The Conservation of Subterranean Cultural Heritage*. CRC Press, Taylor & Francis Group, London pp.125-130, ISBN 978-1-138-02694-0; DOI 10.1201/b17570-17 s2.0-84958762820
21. Clara Urzì, Filomena De Leo, **Laura Bruno**, Domenico Pangallo, Lucia Kracova 2014. New species description, biomineralization processes and biocleaning applications of Roman catacombs-living bacteria. In Saiz-Jimenez C. (Ed.), *The Conservation of Subterranean Cultural Heritage*. CRC Press, Taylor & Francis Group London, pp. 65-72, ISBN 978-1-138-02694-0 DOI 10.1201/b17570-10