

Martina Dal Bello

Physics of Living Systems
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Education

- Università di Pisa, Ph.D, Ecology** Apr 2014
Thesis: “The coincidence of environmental and climatic extremes and the response of primary producers in marine coastal habitats and open systems”
Advisor: Prof. L. Benedetti-Cecchi
- Università di Pisa, M.Sc, Marine Biology** Oct 2010
Final Grade: 110 *cum laude*/110
- Università di Genova, B.Sc, Marine Environmental Sciences** Jul 2008
Final Grade: 110 *cum laude*/110

Research Interests

- Microbial Ecology** biodiversity, stability, metabolism
Marine Ecology microbial photosynthetic biofilms, macroalgae, rocky shores
Global change Ecology extreme events, ecological memory, regime shifts, light pollution
Behavior response to pheromones, optimal foraging, *Caenorhabditis elegans*

Research Experience

- MIT, Gore Lab for Ecological Systems Biology**, Postdoctoral researcher Oct 2016 – Present
- Determinants of microbial diversity: Discovered that resource-diversity relationships in bacterial communities reflect the network structure of microbial metabolism.
 - Environmental drivers of microbial community composition: Verified the prediction that seasonal and latitudinal increases in temperature favors slow-growing bacteria in natural marine communities.
 - Pheromone learning and optimal foraging: Experimentally demonstrated that, in the model nematode *C. elegans*, switching from attraction to repulsion in the response to pheromones optimizes foraging.
- Università di Pisa, Benedetti-Cecchi Lab**, Postdoctoral researcher May 2014 – Aug 2016
- New disturbance regimes and catastrophic shifts in intertidal microbial communities: Experimentally demonstrated that the probability to shift from photosynthetically active biofilms to bare rock depends on the degree of temporal clustering of extreme weather events.
 - Early warning signals of catastrophic regime shifts: using intertidal macroalgal communities as model system, tested the efficacy of the indicators of impending regime shifts in a natural setting.

- Università di Pisa, Benedetti-Cecchi Lab**, Ph.D student Jan 2011 - April 2014
- New disturbance regimes and ecological memory in intertidal microbial communities: Experimentally showed that the strength of ecological memory is affected by the degree of temporal clustering of extreme weather events.
 - Spatial patterns in intertidal assemblages: Gained insights into the multifractal patterns of distribution of intertidal microbial communities. Set up an image-based method to non-destructively sample photosynthetic microbes that exploits the spectral properties of chlorophyll a.
- Università di Pisa, Benedetti-Cecchi Lab**, Master student Sept 2009 - Oct 2010
- Evaluated the effects of environmental heterogeneity on the effectiveness of Marine Protected Areas focusing on the structure of fish assemblages.
- Università del Salento**, Visiting student working with Prof. Paolo Guidetti, Oct 2007
- Assessed the effects of protection on fish assemblages in two Marine Protected Areas.

Scholarships

- PhD Fellowship, Università di Pisa - Regione Toscana - 3 years funding Jan 2011
 Postdoctoral Fellowship, Università di Pisa - 2 years funding July 2014

Academic Experience

Teaching

- Instructor, QBio Summer Research Course *Microbial Interactions*, KITP, UCSB Jul 19 - Aug 20 2021
 Teaching Assistant, Master in Marine Biology, course *Ecology and biodiversity of rocky shores*, Università di Pisa 2016
 Teaching Assistant, Master in Marine Biology, course *Marine Biology and Ecology*, Università di Pisa 2011-2015
 Teaching Assistant, Bachelor in Biology, course *Ecology*, Università di Pisa 2011-2015

Training

- LEAPS Part II: Developing your Leadership competencies, MIT April-May 2021
 Forum on Microbial Metabolism, KITP Jan-March 2021
 Winter School on Quantitative Systems Biology: Quantitative Approaches in Ecosystem Ecology, ICTP Nov 30 - Dec 17 2020
 Analysing biological and environmental data using mixed modelling techniques and extensions, Highland Statistics May 9-11 2011

Supervision of students

- Hyunseok Lee, PhD (with Jeff Gore), MIT 2019-present
 Letizia Borelli, Master Thesis, Università di Pisa 2015
 Letizia Borelli, Bachelor Thesis, Università di Pisa 2012

Organization of Scientific Meetings and Seminar Series

Evolutionary and Ecological Systems Biology (EESB) Talks, Online seminar series on recent research in Evolutionary and Ecological Systems Biology https://sites.google.com/view/eesb-talks	June 2020 - present
11th International Temperate Reefs Symposium (ITRS), Università di Pisa	June 2016
Ecological Data Analysis in R: Mixed Effect Models, Università di Firenze	Nov 2014

Participation in Funded Projects

EMBOS, Development and Implementation of a pan-European Marine Biodiversity Observatory System.	2015-2016
COCONET, Towards Coast to Coast NETworks of marine protected areas, FWP7	2012-2016
VECTORS, Vectors of Change in Oceans and Seas Marine Life, Impact on Economic Sectors, FWP7	2011-2015

Reviewer Activity

Marine Ecology Progress Series, Methods in Ecology and Evolution, Marine Biology, Journal of Experimental Marine Biology and Ecology, PLOSone, Journal of Phycology, mSystem, Journal of Sea Research, Scientific Reports, Current Opinion Microbiology

Service, Science Diffusion and Outreach

Scientific Advisor, <i>CrowdfightCOVID-19</i> , Initiative: Put the wider scientific community at the service of COVID-19 research. https://crowdfightcovid19.org/	2020 - present
Team Member, <i>COVID Analytics</i> , Initiative: quickly develop and deliver tools for hospitals and policymakers in the US to combat the spread of COVID-19. https://www.covidanalytics.io/	2020 - present
Member, <i>MIT-POWER for Women</i> Society: Empower Postdoctoral Women Engaged in Research at MIT https://pda.mit.edu/events/power/	2021 - present
Member, <i>MITaly</i> Society: Science and Italian culture dissemination at MIT http://mitaly.mit.edu/	2018 - present
Founder, <i>Successione Ecologica</i> Society: Ecological research diffusion http://www.successionecologica.it/	2013-2016

Publications

Journal Articles

- Abreu, C., **Dal Bello, M.**, Bunse, C., Pinhassi, J., & Gore, J. Ribosomal rna copy number trends in marine communities suggests slow-growing bacteria benefit from warm ocean temperatures. *In prep.*
- Dal Bello, M.** & Benedetti-Cecchi, L. Ecosystems in a rapidly changing world: The role of ecological memory. *In prep.*
- Dal Bello, M.**, Lee, H., Goyal, A., & Gore, J. (2021). Resource-diversity relationships in bacterial communities reflect the network structure of microbial metabolism. *In press Nature Ecology & Evolution*. doi:[10.1101/2020.09.12.294660](https://doi.org/10.1101/2020.09.12.294660).
- Dal Bello, M.**, Pérez-Escudero, A., Schroeder, F. C., & Gore, J. (2021). Inversion of pheromone preference optimizes foraging in *Caenorhabditis elegans*. *eLife*. doi:[10.7554/eLife.58144](https://doi.org/10.7554/eLife.58144).

- Bertsimas, D., Lukin, G., Mingardi, L., ... **Dal Bello, M.**, & et al. (2020). COVID-19 mortality risk assessment: An international multi-center study. *PLOS ONE*. doi:[10.1371/journal.pone.0243262](https://doi.org/10.1371/journal.pone.0243262).
- Maggi, E., Bongiorni, L., Fontanini, D., Capocchi, A., **Dal Bello, M.**, Giacomelli, A., & Benedetti-Cecchi, L. (2020). Artificial light at night erases positive interactions across trophic levels. *Functional Ecology*, *34*(3), 694–706. doi:[10.1111/1365-2435.13485](https://doi.org/10.1111/1365-2435.13485).
- Dal Bello, M.**, Rindi, L., & Benedetti-Cecchi, L. (2019). Temporal clustering of extreme climate events drives a regime shift in rocky intertidal biofilms. *Ecology*, *100*(2), e02578. doi:[10.1002/ecy.2578](https://doi.org/10.1002/ecy.2578).
- Rodríguez Amor, D. & **Dal Bello, M.** (2019). Bottom-up approaches to synthetic cooperation in microbial communities. *Life*, *9*(1). doi:[10.3390/life9010022](https://doi.org/10.3390/life9010022).
- Benedetti-Cecchi, L., Bulleri, F., **Dal Bello, M.**, Maggi, E., Ravaglioli, C., & Rindi, L. (2018). Hybrid datasets: Integrating observations with experiments in the era of macroecology and big data. *Ecology*, *99*(12), 2654–2666. doi:[10.1002/ecy.2504](https://doi.org/10.1002/ecy.2504).
- Bulleri, F., Cucco, A., **Dal Bello, M.**, Maggi, E., Ravaglioli, C., & Benedetti-Cecchi, L. (2018). The role of wave-exposure and human impacts in regulating the distribution of alternative habitats on nw mediterranean rocky reefs. *Estuarine, Coastal and Shelf Science*, *201*, 114–122. Vectors of change in the marine environment. doi:[10.1016/j.ecss.2016.02.013](https://doi.org/10.1016/j.ecss.2016.02.013).
- Rindi, L., **Dal Bello, M.**, & Benedetti-Cecchi, L. (2018). Experimental evidence of spatial signatures of approaching regime shifts in macroalgal canopies. *Ecology*, *99*(8), 1709–1715. doi:[10.1002/ecy.2391](https://doi.org/10.1002/ecy.2391).
- Dal Bello, M.**, Leclerc, J.-C., Benedetti-Cecchi, L., Andrea De Lucia, G., Arvanitidis, C., Van Avesaath, P., ... et al. (2017). Consistent patterns of spatial variability between ne atlantic and mediterranean rocky shores. *Journal of the Marine Biological Association of the United Kingdom*, *97*(3), 539–547. doi:[10.1017/S0025315416001491](https://doi.org/10.1017/S0025315416001491).
- Dal Bello, M.**, Rindi, L., & Benedetti-Cecchi, L. (2017). Legacy effects and memory loss: How contingencies moderate the response of rocky intertidal biofilms to present and past extreme events. *Global Change Biology*, *23*(8), 3259–3268. doi:[10.1111/gcb.13656](https://doi.org/10.1111/gcb.13656).
- Hummel, H., Van Avesaath, P., Wijnhoven, S., ... **Dal Bello, M.**, & et al. (2017). Geographic patterns of biodiversity in european coastal marine benthos. *Journal of the Marine Biological Association of the United Kingdom*, *97*(3), 507–523. doi:[10.1017/S0025315416001119](https://doi.org/10.1017/S0025315416001119).
- Kotta, J., Orav-Kotta, H., Jänes, H., ... **Dal Bello, M.**, & et al. (2017). Essence of the patterns of cover and richness of intertidal hard bottom communities: A pan-european study. *Journal of the Marine Biological Association of the United Kingdom*, *97*(3), 525–538. doi:[10.1017/S0025315416001351](https://doi.org/10.1017/S0025315416001351).
- Maggi, E., Rindi, L., **Dal Bello, M.**, Fontanini, D., Capocchi, A., Bongiorni, L., & Benedetti-Cecchi, L. (2017). Spatio-temporal variability in mediterranean rocky shore microphytobenthos. *Marine Ecology Progress Series*, *575*, 17–29. doi:[10.3354/meps12216](https://doi.org/10.3354/meps12216).
- Puente, A., Guinda, X., Juanes, J. A., ... **Dal Bello, M.**, & et al. (2017). The role of physical variables in biodiversity patterns of intertidal macroalgae along european coasts. *Journal of the Marine Biological Association of the United Kingdom*, *97*(3), 549–560. doi:[10.1017/S0025315416001673](https://doi.org/10.1017/S0025315416001673).
- Rindi, L., **Dal Bello, M.**, Dai, L., Gore, J., & Benedetti-Cecchi, L. (2017). Direct observation of increasing recovery length before collapse of a marine benthic ecosystem. *Nature Ecology & Evolution*, *1*(6), 0153. doi:[10.1038/s41559-017-0153](https://doi.org/10.1038/s41559-017-0153).

Dal Bello, M., Maggi, E., Rindi, L., Capocchi, A., Fontanini, D., Sanz-Lazaro, C., & Benedetti-Cecchi, L. (2015). Multifractal spatial distribution of epilithic microphytobenthos on a mediterranean rocky shore. *Oikos*, 124(4), 477–485. doi:10.1111/oik.01503.

Sanz-Lázaro, C., Maggi, E., Rindi, L., **Dal Bello, M.**, & Benedetti-Cecchi, L. (2015). Effects of grazer diversity on marine microphytobenthic biofilm: A “tug of war” between complementarity and competition. *Marine Ecology Progress Series*, 540, 145–155. doi:10.3354/meps11507.

Theses

Dal Bello, M. (2014). *The coincidence of environmental and climatic extremes and the response of primary producers in marine coastal habitats and open systems* (Doctoral dissertation, Università di Pisa). Retrieved from <https://etd.adm.unipi.it/t/etd-03052014-104216/>

Dal Bello, M. (2010). *Influenza dell'eterogeneità ambientale nella valutazione dell'effetto riserva: Il caso dei popolamenti ittici dell'arcipelago toscano* (Master's thesis, Università di Pisa). Retrieved from <https://etd.adm.unipi.it/t/etd-09072010-153947/>

Talks and Seminars

Invited Seminars

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| What's on the menu: Linking available resources to microbial community diversity. <i>Workshop on Limits to Diversity Assembly</i>
ICTP - International Center for Theoretical Physics, Italy, Hosted by Jacopo grilli, Mercedes Pascual, Matteo Marsili, Silvia Zaoli | 20-Jan-21 |
| A simple linear relationship between resource availability and microbial community diversity. <i>Evolutionary and Ecological Systems Biology Talks</i>
MIT, USA, Hosted by Jeff Gore | 22-Sep-20 |
| A simple linear relationship between resource availability and microbial community diversity. <i>Finch Therapeutics Internal Seminar Series</i>
Finch Therapeutics, USA, Hosted by Ylaine Geraldine | 10-Mar-20 |
| From organism to ecosystem memory: how past events shape responses of ecological systems. <i>Marine Science Center Seminar Series</i>
Northeastern University, USA, Hosted by Brian Helmuth | 6-Feb-20 |
| Attraction to pheromones in <i>Caenorhabditis elegans</i> can be reversed through associative learning. <i>Physics of Living Systems Short Talks Seminar Series</i>
MIT, USA, Hosted by Jeff Gore, Nikta Fakhri | 16-Nov-18 |
| New disturbance regimes, ecological memory and resilience of rocky shore microalgal assemblages. <i>Environmental Science Seminar Series at Parsons Lab</i>
MIT, USA, Hosted by Serguei Saavedra | 20-Apr-18 |
| New disturbance regimes, ecological memory and resilience of rocky shore microalgal assemblages. <i>Biology Seminar Series</i>
Woods Hole Oceanographic Institution (WHOI), USA, Hosted by Michael Neubert, Stephanie Jenouvrier | 30-May-18 |

Talks at Conferences

Resource-diversity relationships in bacterial communities reflect the network structure of microbial metabolism <i>Stochastic Models and Experiments in Ecology and Biology</i> , Venice and online, Italy	Jun-22-21
A simple linear relationship between nutrient availability and microbial community diversity <i>ISME #UnityInDiversity Symposium</i> , Online, Awarded a Prize	Nov 11-12, 2020
Inversion of pheromone preference optimizes foraging in <i>C. elegans</i> <i>MIT Biophysics Retrest 2019</i> , Falmouth, USA	Oct 6-7, 2019
Temporal clustering of extreme events drives a regime shift in rocky intertidal biofilms. <i>12th International Temperate Reef Symposium (ITRS)</i> , Hong Kong, Cina	Jan 6-11, 2019
Experimental extreme events induce alternative states in rocky shore biofilms. <i>XVIII Congresso Società Italiana di Ecologia (SItE)</i> , Cagliari, Italy	Sept 12-14, 2018
Associative learning regulates <i>Caenorhabditis elegans</i> response to pheromones. <i>6th Annual Winter q-bio Meeting</i> , Maui, Hawaii, USA	Feb 22-25, 2018
Legacy effects and memory loss: how contingencies moderate the response of rocky intertidal biofilms to present and past extreme events. <i>Ecological Society of America (ESA) 2017 Annual Meeting</i> , Portland, USA	Aug 6-11, 2017
Legacy effects and memory leaks: how contingencies moderate the response of rocky intertidal biofilms to present and past extreme events. <i>11th International Temperate Reef Symposium (ITRS)</i> , Pisa, Italy	Jun 26-30, 2016
Consistent patterns of spatial variability between NE Atlantic and Mediterranean rocky shores. <i>50th European Marine Biology Symposium (EMBS)</i> , Helgoland, Germany	Sept 21-25, 2015
Grazing overwhelms the impacts of extreme climatic events on intertidal microphytobenthos. <i>Aquatic Biodiversity and Ecosystems (ABEC)</i> , Liverpool, UK	Aug 30 - Sept 4, 2015
Complex patterns of spatial distribution of epilithic microphytobenthos on a Mediterranean rocky shore. <i>XIII Congresso Società Italiana di Ecologia (SItE)</i> , Ancona, Italy	Sept 16-18, 2013
Scales of variability of biofilm abundance on rocky shores. <i>XII Congresso Società Italiana di Ecologia (SItE)</i> , Alessandria, Italy	Sept 10-13, 2012

Technical Skills

Programming	R, Python, L ^A T _E X
Web Design	Jekyll
Image processing and analysis	Illustrator, Photoshop, ImageJ
Diving	PADI Certified Divemaster

Languages

Italian	Mother tongue
English	Fluent (C2)
French, Spanish	Basic (A2)

Interests and Activities

Arts Scientific Illustration, Drawing, Sculpting, Piano playing

References

Prof. Jeff Gore

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Prof. Lisandro Benedetti-Cecchi

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