

Curriculum Vitae

updated January 27, 2024

Personal

Name: Dr. rer. nat. Axel Gerhard Rossberg
Citizenship: British, German
Current Position: Reader in Theoretical Ecology
Work Address: School of Biological and Chemical Sciences
Queen Mary University
327 Mile End Rd
London E1 4NS
UK

Electronic: a.rossberg@qmul.ac.uk,
http://www.sbcs.qmul.ac.uk/staff/axelrossberg.html

Education

January '98 Doktor der Naturwissenschaften (Ph.D., physics), "summa cum laude" (beyond best regular grade)
Dissertation Title: *The Amplitude Formalism for Pattern-Forming Systems with Spontaneously Broken Isotropy and some Applications*
10/1994 – 09/1998 Universität Bayreuth, doctoral student, Supervisor: L. Kramer
08/1994 Master of Arts, Supervisor: J. Swift
10/1993 – 09/1994 University of Texas at Austin, 2 semesters, Major: Physics, Minor: Mathematics
Thesis Title: *Onset of Double Diffusive Convection in Hele-Shaw Geometry*
08/1992 Vordiplom (pre-diploma), "sehr gut" (best regular grade)
10/1990 – 09/1993 Universität Würzburg, 6 semesters, Major: Physics, Minor: Computer Science

Appointments

09/2015 – Reader in Theoretical Ecology, School of Biological and Chemical Sciences, Queen Mary University London, UK
01/2013 – 08/2015 Honorary Lecturer, School of Environmental Sciences, University of East Anglia, UK
02/2014 – 08/2015 Principal Scientist at Centre for Environment, Fisheries & Aquaculture Science (Cefas), UK
01/2012 – 01/2014 Senior Scientist at Centre for Environment, Fisheries & Aquaculture Science (Cefas), UK
08/2010 – 08/2015 Senior Researcher Fellow (later part time) at School of Biological Sciences, Queen's University Belfast, UK
08/2008 – 07/2010 Research Fellow at School of Biological Sciences, Queen's University Belfast, UK
04/2007 – 08/2008 Research Scholar at IIASA (International Institute for Applied Systems Analysis), Austria
04/2005 – 03/2006 Part-Time Lecturer at Sophia University, Tokyo, Japan
10/2003 – 03/2007 Visiting Associate Professor at Center of Excellence "Environmental Risk Management for Bio/Eco-Systems", Yokohama National University, Japan
04/2001 – 09/2003 Researcher at Center for Data Analysis and Modeling, Universität Freiburg, Germany
10/2000 – 03/2001 Visiting Scholar at Department of Philosophy, Columbia University, New York, NY, U.S.A.
10/1998 – 09/2000 Postdoctoral Researcher at Nonlinear Dynamics Group, Kyoto University, Kyoto, Japan
10/1996 – 09/1998 Research Assistant at Department of Physics, Universität Bayreuth, Germany
10/1995 – 09/1996 Teaching Assistant at Department of Physics, Universität Bayreuth, Germany

Teaching

Postgraduate	2023 –	Developer and Program Director of new <i>MSc Artificial Intelligence in the Biosciences</i>
Postgraduate	09/2019	Biomathematics ESMTB Summer School 2019 – two lectures on Modelling in Marine Ecology: <i>Size-spectrum modelling</i> and <i>The inherent parameter sensitivity of marine food-web models and how to deal with it in fisheries management</i> (guest lectures)
Undergraduate	09/2018 –	Queen Mary University London, <i>Research Methods and Communication I & II</i>
Undergraduate	09/2017 – 08/2020	Queen Mary University London, Module Convenor for undergraduate final year research projects
Postgraduate	10/2016	Queen Mary University London, <i>Statistics and Bioinformatics</i>
Postgraduate	01/2016 – 01/2021	Queen Mary University London, <i>Ecological Theory and Applications</i>
Postgraduate	09/2015 –	Queen Mary University London, <i>Ecosystem Structure and Functioning</i>
Postgraduate	07/2014	DEVOTES Summer School at AZTI-Tecnalia, <i>Understanding the mechanics of marine food webs</i> and <i>Applying food-web theory for management and the Marine Strategy Framework Directive</i> (guest lectures)
Postgraduate	11/2013	School of Mathematics, University of East Anglia, <i>Why food webs are hard to model</i> (guest lecture)
Undergraduate	10/2010 – 12/2010	School of Biological Sciences, Queen's University Belfast, <i>Biochemical Methods, Experimental Design and Statistics</i> (lectures and practicals)
Undergraduate	04/2005 – 03/2006	Faculty of Comparative Cultural Studies, Sophia University, Tokyo, <i>Environmental Issues I&II</i> (two full-semester lectures)
Postgraduate	04/2004 – 03/2007	Graduate School of Environment and Information Sciences, Yokohama National University, <i>Basic Methods of Theoretical Ecology and their Application</i> (three full-semester lectures, in Japanese)
Postgraduate	10/2001 – 02/2002	Fakultät für Physik, Universität Freiburg, <i>Concepts of Nonlinear Dynamics</i> (full semester lecture, co-toughed with Jens Timmer, in German)
High-School	11/2001	Freiburg Seminar, City of Freiburg <i>The Four Capital Sins of Modeling</i> (in German)
Undergraduate	10/1995 – 09/1996	Department of Physics, University of Bayreuth, <i>Electrodynamics</i> (two full semester problem-solving classes, in German)

Supervision and Tutoring

2022 –	PhD	Dominik Maczik, <i>Evaluating Biodiversity Policies using the Lotka-Volterra Meta-community Model</i> .
2022 –	PDRA	Emmanuel Chibuike Nwankwo, <i>Mechanisms and prediction of large-scale ecological responses to environmental change</i> (NERC Highlights topic grant)
2021 – 2022	MSc	Yasin Bahadır Aydin, <i>Is there a universally preferred value for the steepness of stock-recruitment relations?</i> (sole supervisor)
2021 – 2022	MSc	Sara Fernández, <i>Modelling pollination in two different environments through the identification of self-organised patterns</i> (sole supervisor)
2021 – 2022	BSc	Silvia Zwierzyk-Teles, <i>Determinants of dietary diversity across the animal kingdom</i> (sole supervisor)
2021 – 2022	BSc	Teodora Borilova, <i>Determinants of pollinator interaction diversity</i> (sole supervisor)
2021 –	PhD	Shijun MU, <i>Corporate Environmental Reporting and Biodiversity-friendly Innovation: the Role of Independent Academic Directors</i> (2nd supervisor)

2021 –	PhD	Samuel John Shrimpton, <i>Predicting the response of endangered sea turtles to a changing climate</i>
2020 – 2022	PDRA	Chris Terry, <i>Mechanisms and prediction of large-scale ecological responses to environmental change</i> (NERC Highlights topic grant)
2020 – 2022	PDRA	Jacob Louis Dinner O'Sullivan, <i>Mechanisms and prediction of large-scale ecological responses to environmental change</i> (NERC Highlights topic grant)
2020 – 2021	MSc	Arjun Singh Padda, <i>What shapes the trophic pyramid of species richness - how is diversity at high trophic levels controlled by that at lower levels?</i>
2020 – 2021	BSc	Lili Csege Csorba, <i>Evaluation of strategies to manage coral disease outbreaks</i>
2020	Summer Student	Emmanuel J Spelman, <i>Relationships between specialisation and species richness in bipartite ecological interaction networks</i>
2019 –	PhD	Thomas Julian Del Santo O'Neill, <i>Methods and policy pathways to optimise production of multiple interacting fish stocks</i>
2018 – 2019	MSc	Thomas Julian Del Santo O'Neill, <i>Assessment of management options to attain Maximum Sustainable Yield from multiple interacting stocks in the North Sea</i>
2017 – 2018	BSc	Bilal Ashraf Sahi, <i>Interaction diversity of communities residing within prey-predator, mutualistic and host-parasitic network types</i>
2017 – 2019	PhD	Jacob Louis Dinner O'Sullivan, <i>Spatially explicit theoretical community ecology</i> .
2016 – 2020	PhD	Orestes Gutierrez al-Khudhairy, <i>Ecological constraints and adaptation of attack rates</i> .
09/2015 –	BSc	Personal academic advisor to about 8 students per cohort
2014	Guest Student	Nao Takashina, <i>Maximum sustainable yield in size-structured populations</i>
2012	Summer Student	Rebecca Reid, <i>Total reproductive value as an index for stock size of commercial fish</i>
2009 – 2013	PhD	Tak Fung, <i>Sustainable fisheries and the diversity of marine communities: A theoretical investigation</i> , co-supervised with Keith Farnsworth
2009 – 2013	PhD	Jennifer Houle, <i>Size-structured modelling tools for an Ecosystem Approach to Fisheries Management</i> , co-supervised with Keith Farnsworth
2005 – 2007	PhD	Hiroshi Serizawa, <i>Mathematical analyses of spatiotemporal dynamics of colonial cyanobacteria in lake ecosystems</i> , co-supervised with Takashi Amemiya
2005 – 2006	Bachelor	Kaori Yanagi (Statistics of trophic interaction strengths), co-supervised with Takashi Amemiya
2004 – 2005	Bachelor	Takuo Yumura (Analysis of food-web topology), co-supervised with Takashi Amemiya
2004 – 2007	PhD	Takatoshi Enomoto (theory and experiments on bi-stability in ecosystems), co-supervised with Takashi Amemiya
2002 – 2003	Diploma	Kilian Bartholomé, <i>Non-linear data analysis for vortex flow-meters</i> , co-supervised with Jens Timmer
1997 – 1998	Diploma	Anke Lindner, <i>Three-dimensional Pattern formation in liquid crystals</i> , co-supervised with Lorenz Kramer

Research Grants

- 2023 – 2024 Co-PI of NERC-funded coordination function of £5M research program *Integrating Finance and Biodiversity for a Nature Positive Future*, £250k, £59k for QMUL
- 2023 PI of NERC-funded *Mediating the first transaction of Biodiversity Impact Credits*, £151k for QMUL
- 2022 PI of NERC/Finance for Biodiversity funded Knowledge Exchange Fellowship *Catalysing the emergence of a biodiversity stewardship credit market*, £61k for QMUL
- 2022 Co-I of UKRI funded *Bioacoustic monitoring using drones*, £47k for QMUL
- 2020 – 2025 PI of NERC funded *Mechanisms and prediction of large-scale ecological responses to environmental change*, £1.21M for QMUL
- 2019 – 2022 PI of UKRI funded LIDo iCASE studentship with Cefas to study *Methods and policy pathways to optimise production of multiple interacting fish stocks*
- 2016 – 2018 Co-I and WP leader in UKRI/Defra-funded *Marine Ecosystems Research Program – ‘Work Package 3’ (awarded separately)*, £500k, £55k for QMUL.
- 2015 – 2018 PI of Cefas Service contract, £75k for QMUL
- 2014 – 2018 Co-I and WP leader in UKRI/Defra-funded *Marine Ecosystems Research Program*, £4M (£300k for Cefas, £70k for QMUL)
- 2012 – 2016 EU-FP7 DEVOTES (*Innovative Tools for Understanding and Integrated Assessment of Good Environmental Status (GES) of Marine Waters*), €9M (€560k for Cefas)
- 2012 – 2017 Co-I for FizzyFish (*Response of ecosystems and fisheries to management in a changing environment*) Defra project to develop management options for fisheries and climate-change impacts, M1228, £1.25M for Cefas
- 2012 – 2016 Co-PI for MYFISH EU-FP7 collaboration to operationalise Maximum Sustainable Yield, €5M (€220k for QUB)
- 1998 – 2000 JSPS/Alexander von Humboldt Foundation research fellowship, ¥7,200,000 (≈£50,000)
- 1994 – 1996 Deutsche Forschungsgemeinschaft: research fellowship

Selected Invited Lectures

- 2023 Panelist speaking on *Measuring Returns of Nature* at Forestry & Agriculture Investment Summit
- 2023 Biodiversity Impact Credits direct markets towards rigorous science-based targets for global species extinction risk at all scales, at public workshop A Multidisciplinary Approach to Biodiversity, University of Birmingham.
- 2022 Ecological structural instability as a pervasive mechanism controlling ecosystem structure and dynamics, at Theo Murphy scientific meeting: Microbial Ecology for Engineering Biology, The Royal Society, Milton Hill House, Oxfordshire.
- 2020 How Ecological Structural Instability Explains Biodiversity Patterns: Theory and Management Implications. At Genetics, Evolution and Environment Seminar, University College London.
- 2018 How food webs control biodiversity in aquatic ecosystems. At Swire Institute of Marine Science, University of Hong Kong.
- 2016 Mechanisms structuring food webs and their quantitative signatures. Ecology & Evolution Seminar, Imperial College, London.
- 2015 Biodiversity - Function - Emergence. At sFIND workshop, German Centre for Integrative Biodiversity Research (iDiv), Leipzig.
- 2014 Beyond survival of the fittest: evolutionary adaptation of attack rates and niche widths in food webs. At workshop on *Non-adaptive selection: explaining macroecological laws in ecology and evolution*, Ecolé Polytechnique Fédérale Lausanne, Centre Interfacultaire Bernoulli, Lausanne.
- 2013 The role of demographic stochasticity for the formation of species. At of Institute for Advanced Study, Kyushu University, Fukuoka.
- 2013 Mechanisms determining biodiversity in food webs. At FroSpects Workshop on Species Interactions and Speciation, Umeå University.

- 2013 Food webs and biodiversity. At Mathematical Ecology Seminar of Center for Ecological Research, Kyoto University, Kyoto.
- 2011 A new universal power law emerging in complex food webs. At ICELAB Seminar, Umeå University.
- 2011 Mechanisms determining biodiversity and dietary diversity in marine food webs. At symposium on *The structure and dynamics of ecological networks* at University of Fribourg.
- 2011 Applying a realistic food-web model to a real management problem. At symposium on *The structure and dynamics of ecological networks* at University of Fribourg.
- 2008 The problem of biodiversity. Invited lecture at JST Presto Symposium on Mathematical Sciences towards Environmental Problems, Sapporo.
- 2008 The physics of food-webs. At Hungarian Academy of Science, Budapest.
- 2007 Networks of complex evolving autonomes. Invited lecture at NANIA conference, Edinburgh.
- 2006 Yet another food-web model. Invited lecture at International Conference on Ecological Modelling, Yamaguchi.
- 2006 Trophic link density, the diet partitioning function, and the search for universality in ecological communities. At Japanese-Korean Joint Meeting for Mathematical Biology, Fukuoka.
- 2006 Encounters with the statistical mechanics of food webs. Invited lecture at International Symposium on Biodiversity and Dynamics of Communities and Ecosystems: Structures, Processes and Mechanisms, Osaka.
- 2005 An evolutionary mechanism that reproduces the structure of food-webs. Invited Speaker at annual meeting of Society of Evolutionary Studies of Japan, Sendai. In Japanese.
- 2005 An evolutionary mechanism reproducing food-web structure. At Japanese Society for Mathematical Biology, Annual Meeting, Yokohama.
- 2004 A generic scheme for choosing models and characterizations of complex systems. Invited lecture at International Conference on Molecular Simulation-Computational Science Workshop, Tsukuba University.
- 2003 Synchronization vs linear filtering for extracting phase information from noisy time series. At Society for Industrial and Applied Mathematics, Annual Meeting, Snowbird.
- 2001 The four capital sins of modelling. Invited lecture at Freiburg Seminar (high-school students), Freiburg. In German.

Recognition

- 2022 Fellow of the Higher Education Academy
- 2022 Invitation to a one-month visit at Center for Ecological Research, Kyoto University, Japan, funded by Japan Society for the Promotion of Science (visit cancelled because Japan closed borders due to Omicron)
- 2020 – Member of Faculty Opinions
- 2021 1.5 months visit at Heinrich Heine University Düsseldorf, Germany, funded by Alexander von Humboldt foundation
- 2021 – Fellow of UK's Alan Turing Institute
- 2013 The monograph *Food Webs and Biodiversity: Foundations, Models, Data*, ISBN 9-780470973-55-4, wins PROSE Award in the category "Biological Sciences"
- 1998 City of Bayreuth: "Best dissertation of the year"
- 1994 – 1996 DAAD Study Abroad Scholarship
- 1993 – 1994 Studienstiftung des Deutschen Volkes (German National Merit Foundation): regular fellow

Editorial Work

- 2015 – Editor, *Theoretical Ecology*
2008 – 2023 Associate Editor, *The American Naturalist*
2007 Guest editor, Special Section on Current Food-Web Theory in *Ecological Complexity* 5(2), 2008 (together with Katsuhiko Yoshida)

Society Memberships

- 06/2010 – British Ecological Society
08/2010 – International Union for the Conservation of Nature
04/2008 – The American Society of Naturalists
11/2005 – 01/2007 Ecological Society of Japan
08/2005 – 08/2015 Ecological Society of America
04/2005 – 01/2007 Society of Evolutionary Studies (Japan)
08/2004 – 08/2008 Japanese Society of Mathematical Biology
09/2000 – 10/2008 American Physical Society
02/1999 – 01/2007 Physical Society of Japan
10/1994 – 08/2008 Deutsche Physikalische Gesellschaft

Other Responsibilities

- 2022 – Co-founder and co-Lead of the Biodiversity Monitoring and Assessment Interest Group of the AI-centred Alan Turing Institute.
2020 – Co-founder and Chair of Board of Trustees of International Initiative for Theoretical Ecology (IITE)
2015 – 2018 Expert Advisor to Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES), Lead Author of Regional Assessment for Europe and Central Asia
2012 – 2015 UK delegate to the expert group on Food Webs at OSPAR
2012 – 2015 Cefas representative at the Healthy and Biologically Diverse Seas Evidence Group, advising UK governmental agencies
2009 – 2015 UK delegate to the International Council for the Exploration of the Sea (ICES), contributing to numerous working groups and workshops related to marine biodiversity.
2001 – 2003 Guest-speaker program at Center for Data Analysis and Modeling, Freiburg
1996 – 1998 Administration of computing facilities at Department for Theoretical Physics, U Bayreuth

Programming Experience

C, C++, FORTRAN, R, Mathematica, Matlab, Sage, AWK, Perl, Lisp, FOURTH, Assembler.
Contributions to the X.org touchpad driver contained in all major Linux distributions.

Language Skills

German (native), English, Japanese, Portuguese