

# Jonathan P. Bollback

## CONTACT INFORMATION

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## ACADEMICS

### *Positions*

2016 -	Senior Lecturer	University of Liverpool
2010 - 2016	Assistant Professor	IST Austria
2010 - 2014	Deputy Graduate Program Chair, IST Austria	IST Austria

### *Degrees*

2004	Ph.D. (Evolutionary Genetics)	University of Rochester, New York
2000	M.Sc. (Evolutionary Genetics)	University of Rochester, New York
1995	B.Sc. (Biology)	University of Maryland, Maryland

### *History*

2008 - 2010	Postdoctoral Research Associate	University of Edinburgh (A. Leigh-Brown and A. Rambaut)
2004 - 2008	Postdoctoral Research Associate	University of Copenhagen (R. Nielsen)
1998 - 2004	Doctoral Student	University of Rochester (J. P. Huelsenbeck)
1995 - 1998	Doctoral Student	University of Maryland (G. Borgia)
1993 - 1995	Undergraduate Studies	University of Maryland
1990 - 1993	Undergraduate Studies	SUNY College at Purchase

### *Fellow Appointments*

1995 - 1998	Predocctoral Fellow, Laboratory of Molecular Systematics, Smithsonian Institution
1997	NSF RTG Fellow, University of Maryland

### *Research Grants*

2015 - 2020	ERC Consolidator Grant - Horizon 2020 European Research Council No. 648440, <b>1,820,865</b> Euro
2015 - 2018	NOE Forschungs- und Bildungsges.m.b.H. (NFB) Grant (Co-PI) No. LS14-006, <b>267,440</b> Euro
2007 - 2008	Danish Agency for Science, Technology and Innovation The Danish Natural Science Research Council Forskningsrådet for Natur og Univers, FNU (Ref. No. 272-06-0316), <b>1,498,528</b> DKK <i>[Note: At the time this was the largest 2 year grant ever awarded to an independent post-doctoral researcher.]</i>
2006 - 2007	Danish Agency for Science, Technology and Innovation (Co-PI) Danish Medical Research Council Forskningsrådet for Sundhed og Sygdom, FSS (Ref. No. 271-05-0599), <b>576,000</b> DKK

### **Teaching Experience: Courses**

Course	Level	Duration (Weeks)	Teaching (Hours)
Advanced Skills in Biology	Advanced Undergrad	24	30/5
3 <sup>rd</sup> Year Genetics Tutorial	Advanced Undergrad	12	20
Statistical Phylogenetics	Graduate	12	58
Microbial Genetics	Graduate	12	26
Classics in Evolutionary Biology	Graduate	12	26
Molecular Population Genetics	Graduate	12	5
Introduction to Programming	Introductory	2	50
Programming for the Life Sciences	Graduate	4	20
Principles of Evolution	Introductory	6	24
Essential Skills for the Life Sciences 2	Introductory	24	30
Advanced Techniques in Zoology	Introductory Practical	4	32
Zoology Field Course	Field Course	3	224
Advanced Biotechnology/Synthetic Biology	Advanced Undergrad	12	30

### **Teaching Experience: Workshops**

Workshop	Co-ordinators	Teaching Time
Evolutionary Genetics Workshop	Nick Barton; J. Bollback	2hrs
NGS for Population Genetics and Experimental Evolution	C. Kosiol; V. Mustonen C. Schlötterer; J. Bollback	2hrs

## **GROUP MEMBERS**

### **Current PhD Students**

2017 - **Jack Fitzpatrick** (University of Liverpool)

### **Former Postdoctoral Research Associates**

2017 - 2019 **Hande Acar** (University of Liverpool)  
2017 - 2019 **Pavel Payne** (University of Liverpool)  
2013 - 2017 **Mato Lagator** (IST Austria)  
2016 - 2016 **Nela Nikolic** (IST Austria)  
2015 - 2016 **Xiaoyun Tu** (IST Austria)  
2010 - 2014 **Rodrigo A. F. Redondo** (IST Austria)  
2010 - 2013 **Anne Kupczok** (IST Austria)

### **Former PhD Students**

2017 - 2020 **Rama Bhatia** (University of Liverpool)  
2011 - 2016 **Hande Acar** (IST Austria)  
2012 - 2016 **Fabienne Jesse** (IST Austria)  
2012 - 2016 **Pavel Payne** (IST Austria)  
2014 - 2018 **Claudia Iglar** (IST Austria)  
2014 - 2020 **Isabella Tomanek** (IST Austria)  
2016 - 2019 **Catia Pacifico** (VetMed Uni, Austria)

### **Former Master Students**

2016 - 2017 **Adam Harris** (University of Liverpool)  
2016 - 2016 **Katharina Poecher** (FH Campus Wien)  
2014 - 2014 **Anaís Moreno** (Erasmus Program, University of Porto)

## **SCIENTIFIC IMPACT AND SERVICE**

### **Invited Lectures**

- 1) November 2019. Institute of Organismal Biology, Uppsala University, Sweden.
- 2) March 2017. Instituto Gulbenkian de Ciencia. Lisbon, Portugal.
- 3) February, 2017. IEB Seminar Series, University of Edinburgh.

- 4) December, 2016. Ewha BRL Colloquium: Advances in evolutionary biological research: adaptation in microbial and other systems. Organised by Basic Research Laboratory for the Genomics of Adaptive Evolution, Ewha Womans University, Seoul, South Korea
- 5) July, 2015. Biosciences, University of Exeter, Exeter, UK
- 6) April, 2015. Department of Genetics, University of Cambridge, Cambridge, UK
- 7) August, 2014. Department of Pathobiology, VetMedUni, Vienna, Austria
- 8) February, 2011. Host-parasite coevolution, Winter-school of the DFG Priority Programme SPP 1399, IST Austria
- 9) May, 2011. Institute of Population Genetics, VetMedUni, Vienna, Austria
- 10) November, 2010. Symposium, EvolVienna, Vienna, Austria
- 11) September, 2009. Symposium, ICHAIR Annual Workshop, Interdisciplinary Centre for Avian and Human Influenza Research, Edinburgh, Scotland
- 12) April, 2007. Mathematical Genetics of Selection and Adaptation | University of Aarhus
- 13) October, 2005. Reunión Anual Sociedad de Biología de Chile, Sociedad de Ecología - Sociedad de Botánica
- 14) May, 2005. Evolutionary Biology Center, Uppsala Universitet, Uppsala, Sweden
- 15) March, 2005. Symposium: Using Ancestral Sequence Reconstruction to Understand Protein Function, Kristineberg, Sweden
- 16) November, 2003. Journées de la Société Française de Systématique, Muséum National d'Historie Naturelle, Paris, France
- 17) August, 2002. Bayesian inference of phylogeny and molecular evolution, Ph. D. Student course | Department of Systematic Zoology, Uppsala University, Uppsala, Sweden.
- 18) December, 2001. Department of Biologie II, Evolutionary Biology, Ludwig-Maximilians-University, Munich, Germany
- 19) Fall, 1996. Department of Plant Biology, University of Maryland

***Referee (Journals)***

*American Naturalist, Evolution, Journal of General Virology, Journal of Molecular Evolution, Molecular Biology and Evolution, Molecular Phylogenetics and Evolution, BMC Evolutionary Biology, Genetics, and Systematic Biology*

***Referee (Funding Agencies)***

NSF, URF, ERC, SNSF, FCT (Panel Member 2017)

***Conference/Programme Organizer***

SMBE 2016, MASAMB 2011, MASAMB 2017

## PUBLICATIONS

### *Bibliometrics (From 2001 to 2022)*

	All	Since 2017
Citations	7643	2563
h-index	24	18
i10-index	32	24

### *Peer-reviewed Articles, Reviews, and Book Chapters by Year*

#### 2022

- 1) Mato Lagator, Srdjan Sarikas, Magdalena Steinrueck, David Toledo-Aparicio, **Jonathan P Bollback**, Calin C Guet, Gasper Tkacik. (2022) predicting bacterial promoter function and evolution from random sequences. *eLife* 11: e64543.
- 2) Rama P Bhatia, Hande A Kirit, Alexander V Predeus, **Jonathan P Bollback**. (2022) Transcriptomic profiling of *Escherichia coli* K-12 in response to a compendium of stressors. *Scientific Reports* 12, Article number: 8788.

#### 2020

- 4) Hande Acar Kirit, Mato Lagator, **Jonathan P Bollback**. (2020) Experimental determination of evolutionary barriers to horizontal gene transfer. *BMC Microbiology* 20: 1 – 13.
- 5) Isabella Tomanek, Rok Grah, M Lagator, AMC Andersson, **Jonathan P Bollback**, Gasper Tkacik, Calin C Guet. (2020) Gene amplification as a form of population-level gene expression regulation. *Nature Ecology and Evolution* 4: 612 – 625.

#### 2018

- 6) Igler, C., Lagator, M., Tkacik, G., **Jonathan P. Bollback\***, Guet, C.C.\* (2018) Evolutionary potential of transcription factors for gene regulatory rewiring. *Nature Ecology and Evolution* 2:1633–1643.
- 7) Payne, P., Geryerhofer, L., Barton, N.H., and **Jonathan P. Bollback**. (2018) CRISPR-based Herd Immunity Limits Phage Epidemics in Bacterial Populations. *eLife* 7:e32035.

#### 2017

- 9) Lagator, M., Sarikas, S., Acar, H., **Jonathan P. Bollback\***, Guet, C.C.\* (2017) Regulatory network structure determines patterns of intermolecular epistasis. *eLife* 6: e28921. [\* Co-senior authors]
- 10) Lagator, M., Paixao, T., Barton, N.H., **Jonathan P. Bollback\***, and Guet, C.C.\* (2017) On the Mechanistic Nature of Epistasis in a Canonical *cis*-Regulatory Element. *eLife* 6: e25192. [\* Co-senior authors]
- 11) Harold P. de Vladar, Rodrigo A.F. Redondo, Tomek Wlodarski, and **Jonathan P. Bollback**. (2017) Evolutionary interplay between structure, energy and epistasis in the coat protein of the  $\phi X174$  phage family. *Journal of the Royal Society Interface*. 14:20160139.

#### 2016

- 12) Lagator, M., Igler, C., Moreno, A., Guet, C.C., and **Jonathan P. Bollback**. (2016) Epistatic interactions in the Arabinose *cis* regulatory element. *Molecular Biology and Evolution*. 33 (3): 761-769.

#### 2014

- 13) Kupczok, A. and **Jonathan P. Bollback**. (2014) Motif depletion in bacteriophages infecting hosts with CRISPR systems. *BMC Genomics*. 15:663.

#### 2013

- 14) Melissa J. Ward, Samantha J. Lycett, Dorita Avila Rojas, **Jonathan P. Bollback** and Andrew J. Leigh Brown. (2013) Evolutionary interactions between haemagglutinin and neuraminidase in avian influenza. *BMC Evolutionary Biology*. 13:222. [10]
- 15) Rodrigo Redondo, Anne Kupczok, Gertraude Stift, and **Jonathan P. Bollback**. (2013) Complete genome sequence of the novel phage MG-B1 infecting *Bacillus weihenstephanensis*. *Genome Announcements*. 1 (3), e00216-13. [6]
- 16) Anne Kupczok and **Jonathan P. Bollback**. (2013) Probabilistic models for CRISPR spacer content evolution. *BMC Evolutionary Biology*. 13:54.

## 2012

- 17) Peter Gravlund, Kim Aaris-Sørensen, Michael Hofreiter, Matthias Meyer, **Jonathan P. Bollback**, Nanna Noe-Nygaard. (2012) Ancient DNA extracted from Danish aurochs (*Bos primigenius*): Genetic diversity and preservation. *Annals of Anatomy*. 194:103-111.

## 2010

- 18) Caitriona M. Guinane, Nouri L. Ben Zakour, Maria A. Tormo-Mas, Lucy A. Weinert, Bethan V. Lowder, Robyn A. Cartwright, Davida S. Smyth, Cyril J. Smyth, Jodi Lindsay, Katherine A. Gould, Adam Witney, Jason Hinds, **J. P. Bollback**, Andrew Rambaut, Jos Penads, and J. Ross Fitzgerald. (2010) Evolutionary genomics of *Staphylococcus aureus* reveals insights into the origin and molecular basis of ruminant host adaptation. *Genome Biology and Evolution*. 2:454-466.

## 2009

- 19) **Jonathan P. Bollback** and John P. Huelsenbeck. (2009) Parallel genetic evolution within and among species of varying degrees of divergence. *Genetics*. 181: 225–234.

## 2008

- 20) **Jonathan P. Bollback**, Tom York, and Rasmus Nielsen. (2008) A likelihood method for estimating  $2N_e s$  from serially sampled di-allelic data. *Genetics*. 179: 497–502.

## 2007

- 21) Petersen, L., **J. P. Bollback**, M. Dimmic, M. Hubisz, Rasmus Nielsen. (2007) Genes under positive selection in *Escherichia coli*. *Genome Research*. 17: 1336–1343.
- 22) **Jonathan P. Bollback** and John P. Huelsenbeck. (2007) Clonal interference is alleviated by high mutation rates in large populations. *Molecular Biology and Evolution*. 24(6):1397–1406.
- 23) Jonas Binladen, M. T. P. Gilbert, **Jonathan P. Bollback**, F. Panitz, C. Bendixen, R. Nielsen, E. Willerslev. (2007) The use of coded PCR primers enables high-throughput sequencing of multiple homolog amplification products by 454 parallel sequencing. *PLoS ONE*. 2(2): e197.
- 24) Eva Freyhult, **Jonathan P. Bollback**, and Paul P. Gardner. (2007) Exploring genomic dark matter: homology search for non-coding RNA. *Genome Research*. 17:117–125.
- 25) Sheila M. Reynolds, Katie Dryer, **Jonathan P. Bollback**, J. Albert C. Uy, Gail L. Patricelli, Timothy Robson, Gerald Borgia, and Michael J. Braun (2007) Behavioral paternity predicts genetic paternity in satin bowerbirds, a species with a non-resource-based mating system. *The Auk*. 124(3):857–867.
- 26) **Jonathan P. Bollback**, Paul P. Gardner, and Rasmus Nielsen. (2007) Estimating the history of mutations on a phylogeny. In "Ancestral Sequence Reconstruction" (Liberles, D. Ed.) Oxford University Press, UK.

## 2006

- 27) **Jonathan P. Bollback** (2006) SIMMAP: Stochastic character mapping of discrete traits on phylogenies. *BMC Bioinformatics*. 7:88.
- 28) Jan E. Conn, Joseph H. Vineis, **Jonathan P. Bollback**, David Y. Onyabe, Richard C. Wilkerson and Marinete M. Póvoa. (2006) Population structure of the malaria vector *Anopheles darlingi* in a malaria-endemic region of eastern Amazonian Brazil. *Am. J. Trop. Med. Hyg.* 74(5): 798–806.
- 29) Andrea J. Betancourt and **Jonathan P. Bollback**. (2006) The mutational landscape model in experimental evolution. *Current Opinions in Genetics and Development*. 16:618–623.

## 2005

- 30) **Jonathan P. Bollback**. (2005) Posterior mapping and predictive distributions. In "Statistical methods in Molecular Evolution" (Nielsen, R. Ed.) Springer Verlag New York, Inc. New York, USA.

## 2003

- 31) John Harshman, Christopher J. Huddleston, **Jonathan P. Bollback**, Thomas J. Parsons, and Michael J. Braun. (2003) True and false gavials: A nuclear gene phylogeny of Crocodylia. *Systematic Biology* 52(3): 386-402.
- 32) John P. Huelsenbeck, Rasmus Nielsen, **Jonathan P. Bollback**. (2003) Stochastic mapping of morphological characters. *Systematic Biology* 52(2):131-158.

## 2002

- 33) **Jonathan P. Bollback** (2002) Bayesian model adequacy and choice in phylogenetics. *Molecular Biology and Evolution*. 19 (7): 1171-1180.
- 34) John P. Huelsenbeck, **Jonathan P. Bollback**, and Amy Levine. (2002) Inferring the root of a phylogenetic tree. *Systematic Biology*. 51 (1): 32-43.

## 2001

- 35) John P. Huelsenbeck, Frederick Ronquist, Rasmus Nielsen and **Jonathan P. Bollback**. (2001) Bayesian inference of phylogeny and its impact on evolutionary biology. *Science*. 294: 2310-2314.
- 36) Jan E. Conn, **Jonathan P. Bollback**, Davide Y. Onyabe, Tessa N. Robinson, Richard C. Wilkerson, and Marinete M. Povoia. (2001) Isolation of polymorphic microsatellite markers from the malaria vector *Anopheles darlingi*. *Molecular Ecology Notes*. 1 (4): 223-225.
- 37) John P. Huelsenbeck and **Jonathan P. Bollback**. (2001) Empirical and hierarchical Bayesian estimation of ancestral states. *Systematic Biology*. 50 (3): 351-366.
- 38) John P. Huelsenbeck and **Jonathan P. Bollback**. (2001) Application of the likelihood function in phylogenetic analysis. In "Handbook of Statistical Genetics" (Balding, D.J., Bishop, M., and Cannings, C., Eds.) Chapter 15, pp. 415-439. John Wiley and Sons, Inc. New York, USA.
- 39) **Jonathan P. Bollback** and John P. Huelsenbeck. (2001) Phylogeny, genome evolution, and host specificity of single-stranded RNA bacteriophage (Family Leviviridae). *Journal of Molecular Evolution*. 52: 117-128.

## 1994

- 40) Dexter B., J. Utter, S. Ferguson, **J. P. Bollback**, B. Moss, T. W. Nalli. (1994) Analysis of organic pollutants in a suburban stream - environmental chemistry at State-University-of-New-York Purchase *Abstract of papers of the American Chemical Society*. 207: 124-CHED, Part 1.

## GROUP MEMBER PUBLICATIONS

The following list contains publications that came from one or more of my group members as a product of their work conducted solely during their tenure in my research group. While they received financial support from me for the research, salary, and intellectual support I do not feel that this alone was sufficient for me being included as an author. I strongly support the development of my group members as independent researchers and as such I refrain from listing myself as a co-author when I feel my contributions fall below the bar.

### *Manuscripts*

- 1) BG Hall, **H Acar**, A Nandipati, M Barlow. (2014) Growth rates made easy. *Molecular Biology and Evolution*. 31(1): 232-238