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<b>A9</b>	Evolutionary comparison of a gene regulatory network between <i>Arabidopsis thaliana</i> and <i>Arabis alpina</i>	Evolution of developmental pathways in plants	<b>Martin Hülskamp</b> , Institut für Botanik, Universität zu Köln	2014-2017
<b>A10</b>	Evolution of annual and perennial life histories in the Brassicaceae	Evolution of adaptive traits in plants, evolution of transcriptional regulation	<b>George Coupland</b> , MPI für Pflanzenzüchtungsforschung, Köln	2010-2013
<b>A10</b>	Evolution of transcriptional regulation during the divergence of annual and perennial plant life histories	Evolution of adaptive traits in plants, evolution of transcriptional regulation	<b>George Coupland</b> , MPI für Pflanzenzüchtungsforschung, Köln	2014-2017
<b>A12</b>	The changing roles of <i>Hox3</i> genes in insect evolution	Evolution of transcriptional control in insects	<b>Kristen Panfilio</b> , Institut für Entwicklungsbiologie, Universität zu Köln	2014-2017
<b>A13</b>	An interdisciplinary approach for understanding diversification of leaf form	Evolution of development in plants, regulatory networks, morphogenesis	<b>Miltos Tsiantis</b> , MPI für Pflanzenzüchtungsforschung, Köln	2014-2017

**Project area B: Evolution within species**

<b>B1</b>	Characterization of potential adaptive trait loci in house mouse populations	Population genetics, adaptive mutations	<b>Diethard Tautz</b> , Institut für Genetik, Universität zu Köln	2006-2008
<b>B2</b>	The role of regulatory changes in speciation processes of the house mouse	Population genetics, evolution of transcriptional regulation	<b>Bettina Harr</b> , Institut für Genetik, Universität zu Köln	2006-2008
<b>B3</b>	The origin and evolutionary dynamics of the p47 GTPases, a vertebrate pathogen resistance mechanism	Evolutionary genetics, immunity	<b>Jonathan Howard</b> , Institut für Genetik, Universität zu Köln	2006-2009
<b>B3</b>	Reciprocal polymorphism and co-adaptation in the <i>Toxoplasma</i> -mouse parasite-host relationship	Host-pathogen coevolution at the species level, origin and evolution of a complex polymorphism	<b>Jonathan Howard</b> , Institut für Genetik, Universität zu Köln	2010-2013
<b>B3</b>	Evolution of virulence polymorphism in a co-evolving system	Population genetics, host-pathogen co-evolution	<b>Jonathan Howard</b> , Institut für Genetik, Universität zu Köln	2014-2017
<b>B5</b>	The genetic basis of adaptive responses to local demands on seed dormancy in two <i>Arabidopsis</i> species	Population genetics, evolution of transcriptional regulation	<b>Juliette de Meaux &amp; Maarten Koornneef</b> , MPI Pflanzenzüchtungsforschung, Köln	2006-2009

<b>B5</b>	The adaptive value of pleiotropic variation: miR824 and the MADS-Box Gene Network	Plant biology, Genetics, Natural Variation, Evolutionary biology, pleiotropy, microRNA	<b>Juliette de Meaux &amp; Maarten Koornneef</b> , MPI für Pflanzenzüchtungsforschung, Köln	2010-2013
<b>B7</b>	Evolutionary adaptation of <i>Daphnia</i> to protease inhibitors in cyanobacteria	Local adaptation, food quality, microevolution, herbivore	<b>Eric von Elert</b> , Zoologisches Institut, Universität zu Köln	2010-2013
<b>B10</b>	Molecular analysis and evolutionary history of an epistatic interaction leading to incompatibility	Plant biology, genetics, natural variation, evolutionary biology	<b>Jane E. Parker &amp; Matthieu Reymond</b> , MPI für Planzenzüchtungsforschung, Köln	2010-2013
<b>B10</b>	Temperature modulation of plant immune responsiveness and fitness	Evolution of plant defence networks, stress hormone pathway homeostasis	<b>Jane E. Parker</b> , MPI für Planzenzüchtungsforschung, Köln	2014-2017
<b>B11</b>	Cost and benefit of bacterial transformation	Gene transfer, experimental evolution, microbial genetics	<b>Berenike Maier</b> , Institut für Theoretische Physik, Universität zu Köln und Biozentrum	2011-2013
<b>B11</b>	Cost and benefit of bacterial transformation	Adaptive evolution of bacteria	<b>Berenike Maier</b> , Institut für Biologische Physik, Universität zu Köln und Biozentrum	2014-2017
<b>B12</b>	The adaptive significance of small-effect mutations in yeast and plants	Population genetics, evolution of regulation	<b>Andreas Beyer</b> Institut für Genetik Universität zu Köln	2014-2017
<b>B13</b> associated	Adaptation of Escherichia coli to a complex ecosystem	Adaptive evolution of bacteria, gut microbiota	<b>Isabel Gordo</b> , Instituto Gulbenkian de Ciência	2014-2017
<b>Project area C: Theory and computational analysis</b>				
<b>C1</b>	Evolutionary Analysis of Molecular Networks	Biological systems analysis, network evolution	<b>Johannes Berg &amp; Michael Lässig</b> Institut für Theoretische Physik, Universität zu Köln	2006-2009
<b>C1</b>	Comparative analysis of gene expression	Gene expression, population genetics	<b>Johannes Berg &amp; Michael Lässig</b> Institut für Theoretische Physik, Universität zu Köln	2010-2013
<b>C1</b>	Evolution of gene expression	Gene expression, population genetics	<b>Johannes Berg &amp; Michael Lässig</b> Institut für Biologische Physik, Universität zu Köln	2014-2017
<b>C2</b>	Evolution of regulatory DNA	Evolutionary biology, bioinformatics	<b>Michael Lässig</b> , Institut für Theoretische Physik, Universität zu Köln, <b>Nikolaus Rajewsky</b> , NYU (affiliated)	2006-2009

<b>C2</b>	Time-dependent selection and adaptation	Population genetics, adaptive evolution, evolution of regulation	<b>Michael Lässig,</b> Institut für Theoretische Physik, Universität zu Köln	2010-2013
<b>C2</b>	Adaptative evolution of microbial and viral populations	Evolutionary theory, adaptation	<b>Michael Lässig,</b> Institut für Biologische Physik, Universität zu Köln	2014-2017
<b>C3</b>	Sequence space models of adaptive evolution	Evolutionary theory, adaptation	<b>Joachim Krug,</b> Institut für Theoretische Physik, Universität zu Köln	2006-2009
<b>C3</b>	Epistasis, recombination and predictability in adaptive evolution	Theoretical population genetics, experimental evolution	<b>Joachim Krug,</b> Institut für Theoretische Physik, Universität zu Köln <b>Arjan de Visser,</b> Wageningen University	2010-2013
<b>C3</b>	Epistasis, recombination and predictability in adaptive evolution	Theoretical population genetics, experimental evolution of bacterial and fungal systems	<b>Joachim Krug,</b> Institut für Biologische Physik, Universität zu Köln <b>Arjan de Visser,</b> Wageningen University	2014-2017
<b>C4</b>	Multi-locus selection models in population genetics and application to population variability data from mammals, insects and plants	Population genetics, modeling and statistical analysis	<b>Thomas Wiehe,</b> Institut für Genetik, Universität zu Köln	2006-2009
<b>C4</b>	Theory of shortest unique substrings in population genetics and comparative genomics	Population genetics and bioinformatics	<b>Thomas Wiehe,</b> Institut für Genetik, Universität zu Köln	2006-2009
<b>C4</b>	Evolutionary innovations – a case study on chromatin insulators	Theoretical population genetics, regulatory evolution in <i>Drosophila</i> , bioinformatics	<b>Thomas Wiehe,</b> Institut für Genetik, Universität zu Köln	2010-2013
<b>C6</b>	Control and evolution of somite pattern formation during early development	Evolution of development, segmentation	<b>Ulrich Gerland</b> Institut für Theoretische Physik, Universität zu Köln	2008-2009
<b>C7</b>	Bacterial genome dynamics: gene acquisitions and losses in response to life style changes	Evolution of metabolic and regulatory networks in bacteria, horizontal gene transfer	<b>Martin Lercher,</b> Institut für Informatik, Heinrich-Heine-Universität Düsseldorf	2010-2013
<b>C7</b>	The role of horizontal gene transfer in life style changes and metabolic adaptations	Adaptive evolution, microbial evolution, lateral gene transfer	<b>Martin Lercher,</b> Institut für Informatik, Heinrich-Heine-Universität Düsseldorf	2014-2017

<b>C9</b>	The evolution of repetitive DNA and its methylation	Protein evolution and function	<b>Achim Tresch</b> , Institut für Botanik, Universität zu Köln und MPI für Planzenzüchtungs- forschung, Köln	2014-2017
<b>Project area Z: Central facilities</b>				
<b>Z2</b>	Computational biology service unit	Sequence analysis, bioinformatics	<b>Andreas Beyer</b> Institut für Genetik <b>Michael Lässig</b> Institut für Biologische Physik Universität zu Köln	2014-2017



## 4. Scientific events

CRC 680 hosted a broad spectrum of events, ranging from international CRC Conferences to topical Seminar Days. These events greatly contributed to scientific exchange, reflecting and advancing new research directions. Here we list the major events, a full list can be found on the [CRC website](#).

### 1. Cologne Spring Meeting: The variable genome

18.3. – 20.3. 2009

Invited speakers: **Stephan Beck** (University College London), **Sebastian Bonhoeffer** (Swiss Federal Institute of Technology, Zürich), **Antony Dean** (University of Minnesota), **Manolis Dermitzakis** (Wellcome Trust Sanger Institute), **Anna Di Rienzo** (University of Chicago), **Richard Durbin** (Wellcome Trust Sanger Institute), **Xavier Estivill** (Centre for Genomic Regulation, Barcelona), **Adam Eyre-Walker** (University of Sussex), **Timothy Frayling** (University of Exeter), **Kelly Frazer** (The Scripps Research Institute), **Laurence Hurst** (University of Bath), **Steve Jones** (University College London), **Andrew Leigh Brown** (University of Edinburgh), **John Mattick** (University of Queensland), **Rasmus Nielsen** (University of California, Berkeley), **Howard Ochman** (University of Arizona), **Redmond O'Hanlon** (Church Hanborough, UK), **Svante Pääbo** (Max Planck Institute for Evolutionary Anthropology, Leipzig), **Nikolaus Rajewsky** (Max Delbrück Center for Molecular Medicine, Berlin), **Stephan C. Schuster** (Pennsylvania State University), **Kári Stefánsson** (deCODE genetics, Reykjavik), **Shamil Sunyaev** (Harvard Medical School, Boston), **Amalio Telenti** (University of Lausanne), **Harmen van de Werken** (Hubrecht Institute, Utrecht), **Joris Veltman** (Radboud University Nijmegen).

### 2. Molecular Basis of Evolutionary Innovations

01.07. – 03.07. 2010

Invited speakers: **Ralf Bundschuh** (Ohio State University), **Curtis Callan** (Princeton University), **Andrew Clark** (Cornell University), **John Colbourne** (Indiana University), **Erez Dekel** (Weizmann Institute), **Laurence Hurst** (University of Bath), **Santiago Elena** (Universidad Polytechnica de Valencia), **Eugene Koonin** (National Center for Biotechnology Information), **Martin Kreitman** (University of Chicago), **Stanislas Leibler** (Rockefeller University, New York and Institute for Advanced Study, Princeton), **Thomas Lengauer** (Max Planck Institute for Informatics), **Sebastian Maerkl** (Ecole Polytechnique de Lausanne), **Christopher Marx** (Harvard University), **Leonid Mirny** (Massachusetts Institute of Technology), **Ville Mustonen** (Sanger Institute), **C. Pal** (Biological Research Center, Szeged), **Dmitry Petrov** (Stanford University), **Boris Shraiman** (Kavli Institute for Theoretical Physics, Santa Barbara), **Shamil Sunyaev** (Harvard University), **Diethard Tautz** (Max-Planck-Institute for Evolutionary Biology).

### 3. Evolutionary Genomics: New Data, New Challenges

SFB 680 / FOR 1078 Joint Conference, 29.09. – 01.10. 2011

Invited speakers: **Rubén Alcázar** (MPI for Plant Breeding Research, Cologne), **John Baines** (Christian-Albrechts-University, Kiel), **Thomas Bataillon** (University of Aarhus), **Frank Chan** (MPI for Evolutionary Biology, Plön), **George Coupland** (MPI for Plant Breeding Research, Cologne), **Susanne Foitzik** (Johannes Gutenberg-University, Mainz), **Isabel Gordo** (Instituto Gulbenkian, Lisbon), **Oskar Hallatschek** (MPI for Dynamics and Self-Organization, Göttingen), **Jonathan Howard** (University of Cologne), **JinYong Hu** (MPI for Plant Breeding Research, Cologne), **Jeffrey Jensen** (University of Massachusetts, Medical School, Worcester), **Michael Lässig** (University of Cologne), **Dirk Metzler** (Ludwig-Maximilians-University, Munich), **Ville Mustonen** (Wellcome Trust Sanger Institute), **John Parsch** (Ludwig-Maximilians-University, Munich), **Frank Rosenzweig** (University of Montana, Missoula), **Christian Schlötterer** (University of Veterinary Medicine, Vienna), **Shamil Sunyaev** (Brigham & Women's Hospital and Harvard Medical School), **Karl Schmid** (University of Hohenheim), **Ana Sousa** (Instituto Gulbenkian, Lisbon), **Diethard Tautz** (MPI for Evolutionary Biology, Plön), **Xavier Vekemans** (University of Lille).

#### 4. **Cologne Spring Meeting: Molecular Ecology and Evolution**

22.02. – 24.02.2012

Invited Speakers: **Ian Thomas Baldwin** (MPI Jena), **Nitin Baliga** (ISB Seattle), **Andrew Beckermann** (University of Sheffield), **Joy Bergelson** (University of Chicago), **Michael Boots** (University of Sheffield), **John Colbourne** (Indiana University), **Santiago Elena** (IBMCP Valencia), **Duncan Greig** (MPI Plön), **Bryan Grenfell** (Princeton University), **Eddie Holmes** (Pennsylvania State University), **Britt Koskella** (Oxford University), **Thomas Mitchell-Olds** (Duke University), **Hélène Morlon** (Ecole Polytechnique Paris), **Wayne Potts** (University of Utah), **Michael Purugganan** (New York University), **Andrew Rambaut** (University of Edinburgh), **Walter Salzburger** (University of Basel), **Johanna Schmitt** (Brown University), **Diethardt Tautz** (MPI Ploen), **Miltos Tsiantis** (University of Oxford), **Daniel Weinreich** (Brown)

#### 5. **Viral Evolution: Linking genetics to Epidemics**

Satellite meeting of Cologne Spring Meeting 2012, 24.02 – 25.02.2012

Invited Speakers: **Trevor Bedford** (University of Edinburgh), **Nico Beerenwinkel** (ETH Zürich), **Julia Gog** (University of Cambridge), **Bryan Grenfell** (Princeton University), **Alice McHardy** (University of Düsseldorf), **Sergei Kryazhimskiy** (Harvard University), **Ville Mustonen** (Wellcome Trust Sanger Institute), **Richard Neher** (MPI Tübingen), **Nico Pfeifer** (MPI Saarbrücken), **Oliver Pybus** (University of Oxford), **Annemie Vandamme** (KU Leuven)

#### 6. **Evolution of Development**

27.08.2014

Invited Speakers: **Cassandra Extavour** (Harvard University), **Nicolas Gompel** (LMU Munich), **Angela Hay** (MIPZ Cologne), **Felicity Jones** (FML Tübingen), **Kristen Panfilio** (University of Cologne)

#### 7. **Perspectives in Biophysics**

08.10. – 10.10.2014

Invited Speakers: **Timo Betz** (Institute Curie, Paris), **Tobias Bollenbach** (IST Austria), **Konstantin Doubrovinski** (Princeton University), **Damien Faivre** (MPIKG, Potsdam), **Stefano Pagliara** (University of Cambridge), **Aleksandre Persat** (Princeton University), **Florian Rehfeld** (Georg-August-Universität, Göttingen), **Steffen Sahl** (Stanford University), **Kurt Schmoller** (Stanford University), **Ingmar Schön** (ETH Zürich), **Max Ulbrich** (Uni Freiburg)

#### 8. **Forecasting Evolution?**

08.07. – 11.07.2015

Invited Speakers: **Dan Andersson** (Uppsala University), **Trevor Bedford** (Fred Hutchinson Cancer Research Center), **Jesse Bloom** (Fred Hutchinson Cancer Research Center), **Arup Chakraborty** (Massachusetts Institute of Technology), **Sarah Cobey** (University of Chicago), **Michael Desai** (Harvard University), **Michael Doebeli** (University of British Columbia), **Daniel Fisher** (Stanford University), **Marco Gerlinger** (Institute of Cancer Research London), **Michael Hochberg** (Centre National de la Recherche Scientifique Montpellier), **Christopher Illingworth** (Cambridge University), **Roy Kishony** (Harvard University), **Natalia Komarova** (University of California Irvine), **Richard Lenski** (Michigan State University), **Stanislas Leibler** (Rockefeller University), **Marta Łuksza** (Institute for Advanced Study Princeton), **Luke Mahler** (University of Toronto), **Berenike Maier** (University of Cologne), **Leonid Mirny** (Massachusetts Institute of Technology), **Richard Neher** (Max Planck Institute Tübingen), **Armita Nourmohammad** (Princeton University), **Colin Russell** (University of Cambridge), **Sohrab Shah** (University of British Columbia), **Boris Shraiman** (University of California Santa Barbara), **Olivier Tenaillon** (Inserm Paris), **Aleksandra Walczak** (Ecole Normale Supérieure)

The Seminar Days and the Cologne Evolution Colloquium had a total of 128 external speakers, as detailed on the [CRC website](#). In addition, there have regular long-term visits of external scientists, ranging from project work of a few weeks to sabbatical stays.



## **5. Organization 2014 - 2017**

### **Scientific Coordinator**

Michael Lässig

### **CRC Board**

George Coupland

Martin Lercher

Michael Lässig

Berenike Maier

Siegfried Roth

Thomas Wiehe

### **Administrative coordinator**

Christa Stitz

### **Participating institutions**

#### **Universität zu Köln**

Institut für Botanik

Institut für Genetik

Institut für Entwicklungsbiologie

Institut für Theoretische Physik

Institut für Zoologie

#### **Heinrich-Heine-Universität Düsseldorf**

Institut für Bioinformatik

#### **Wageningen University**

Laboratory of Genetics

#### **Max-Planck-Institut (MPI) für Pflanzenzüchtungsforschung, Köln**

