

Benjamin de Bivort

Assistant Professor

Department of Organismic & Evolutionary Biology
and Center for Brain Science

Harvard University

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Appointments

- Assistant Professor, Harvard University 2013 – present
Department of Organismic & Evolutionary Biology
Center for Brain Science
- Junior Fellow (Principal Investigator), Rowland Institute at Harvard 2008 – 2013
Evolution of Behavior Group
- Postdoctoral Fellow, Harvard University 2007 – 2008
Giribet Laboratory, Department of Organismic and Evolutionary Biology

Affiliations

- Harvard Program in Neuroscience
- Molecules, Cells, Organisms Graduate Training Program
- Harvard Mind, Brain, Behavior Initiative

Education

- Doctor of Philosophy in Molecular and Cellular Biology, Harvard University 2007
Doctoral Thesis: “Polarity and plasticity elements of the *Drosophila* phototactic circuitry”
- Master of Arts in Molecular and Cellular Biology, Harvard University 2004
- Bachelor of Science in Biology and Mathematics, Duke University 2002
Honors Thesis in Biology: “Notch is required for activity-dependent synaptic plasticity in *Drosophila*”
Senior research in Mathematics: “A closed formula for the number of isothermal classes of n -cycles”

Fellowships & Awards (selected)

- Sloan Research Fellowship 2014 – 2016
- Kavli Fellow 2014
- Merck-Wiley Graduate Fellowship 2005 – 2007
- Ernie Peralta Prize (best departmental candidacy exam) 2004
- Derek Bok Teaching Award (based on student evaluations) 2003
- National Science Foundation Graduate Research Fellowship 2002 – 2005
- PRUV Fellow, Duke University Mathematics Dept. (supports independent research) 2001 – 2002
- Angier B. Duke Memorial Scholarship to Duke (pays all tuition) 1998 – 2002
- Westinghouse Science Competition Semifinalist 1997

Publications

1. Ho S, Jenney C, de Bivort B. How environmental enrichment affects behavioral diversity of genetically identical fruit flies. In preparation.
2. de Bivort B, Onah A, Jawitz O & He W, Dan C, Kunes S. Plasticity and polarity elements of the *Drosophila* phototactic circuitry. Draft.
3. Giribet G, Boyer S, Baker C, Fernández R, Sharma P, de Bivort B, Daniels S, Harvey M, Neethling J, Griswold C. A molecular phylogeny of the temperate Gondwanan family Pettalidae (Arachnida, Opiliones, Cyphophthalmi) with biogeographic and taxonomic implications. Under review.

4. Isakov A & Buchanan S, Sullivan B, Ramachandran A, Chapman J, Lu N, Mahadevan L, de Bivort B. Recovery of locomotion after injury in *Drosophila melanogaster* depends on proprioception. Under review.
5. Ludlow Z, Stepto A, Dearlove J, Diaper D, Humphrey D, Vinatier G, Buhl E, Fiore V, Chen C, Adachi Y, Xia B, White K, Solomon D, Buchanan S, Sigrist J, Ito K, Stanewsky R, Dolan R, Hodge J, Martin J-R, de Bivort B, Strausfeld N, Hirth F. Functional anatomy of an action selection circuitry. Under revision.
6. Kain J, Zhang S, Klein M, Samuel A, de Bivort B. Variability in thermal and phototactic preferences in *Drosophila* may reflect an adaptive bet-hedging strategy. *Evolution*. 2015. In press & <http://biorxiv.org/content/early/2014/11/30/012021>.
7. Crall J, Souffrant A, Akandwanaho D, Hescocock S, Callan S & Coronado M, Baldwin M, de Bivort B. Social context modulates idiosyncrasy of behavior in the gregarious cockroach *Blaberus discoidalis*. *Animal Behaviour*. 2015. In press & <http://biorxiv.org/content/biorxiv/early/2015/10/08/028571>.
8. Buchanan S, Kain J, de Bivort B. Neuronal control of locomotor handedness in *Drosophila*. *Proceedings of the National Academy of Sciences USA*. 2015. 112(21):6700-6705.
9. Ayroles J, Buchanan S, O'Leary C, Skutt-Kakaria K, Grenier J, Clark A, Hartl D, de Bivort B. Behavioral individuality reveals genetic control of phenotypic variability. *Proceedings of the National Academy of Sciences USA*. 2015. 112(21):6706-6711.
10. Kain J, Stokes C, Gaudry Q, Song X, Foley J, Wilson R, de Bivort B. Leg-tracking and automated behavioural classification in *Drosophila*. *Nature Communications*. 2013. 4: #1910.
11. Kane A, Gershow M, Afonso B, Larderet I, Klein M, Carter A, de Bivort B, Sprecher S, Samuel A. Sensorimotor structure of *Drosophila* larva phototaxis. *Proceedings of the National Academy of Sciences USA*. 2013. 110(40): E3868-E3877.
12. de Bivort B. Isotemporal classes of diasters, beachballs, and daisies. *arXiv*. 2013. arXiv:1309.2003.
13. Giribet G, de Bivort B, Hitchcock A, Swart P. On *Speleosiro argasiformis* – a troglobitic Cyphophthalmi (Arachnida, Opiliones, Pettalidae) from Table Mountain, South Africa. *Journal of Arachnology*. 2013. 41: 416-419.
14. Song E, de Bivort B, Dan C, Kunes S. Determinants of the *Drosophila* Odorant Receptor Pattern. *Developmental Cell*. 2012. 22(2): 363-376.
15. Raz S, Graham J, Cohen A, de Bivort B, Grishkan I, Nevo E. Growth and Asymmetry of Soil Microfungal Colonies from “Evolution Canyon,” Lower Nahal Oren, Mount Carmel, Israel. *PLoS ONE*. 2012. 7(4): e34689.
16. de Bivort B, Clouse R, Giribet G. A cladistic reconstruction of the ancestral mite harvestman (Arachnida, Opiliones, Cyphophthalmi): portrait of a Paleozoic detritivore. *Cladistics*. 2012. 22:582-597.
17. Kain J, Stokes C, de Bivort B. Phototactic personality in fruit flies and its suppression by serotonin and white. *Proceedings of the National Academy of Sciences*. 2012. 109(48): 19834-19839.
18. Gaudry Q, Hong E, Kain J, de Bivort B, Wilson R. Asymmetric neurotransmitter release enables rapid odour lateralization in *Drosophila*. *Nature*. 2012. 493: 424-428.
19. Boyer S, Giribet G, Sharma P, Benavides L, Clouse R, de Bivort B, Dimitrov D, Kawauchi G, Murienne J, Schwendinger P. Evolutionary and biogeographic history of an ancient and global group of arachnids (Arachnida, Opiliones, Cyphophthalmi) with a new taxonomic arrangement. *Biological Journal of the Linnean Society*. 2012. 105(1): 92-130.
20. Clouse R, de Bivort B, Giribet G. Phylogenetic signal in morphometric data. *Cladistics*. 2011. 27(4): 337-340.
21. Clouse R, de Bivort B, Giribet G. A phylogenetic analysis for the South-east Asian mite harvestman family Stylocellidae (Opiliones: Cyphophthalmi)—a combined analysis using morphometric and molecular data. *Invertebrate Systematics*. 2010. 23(6): 515-529.

22. de Bivort B, Clouse R, Giribet G. A morphometrics-based phylogeny of the temperate Gondwanan mite harvestmen (Opiliones, Cyphophthalmi, Pettalidae). *Journal of Zoological Systematics and Evolutionary Research*. 2010. 48(4): 294-309.
23. de Bivort B, Giribet G. A systematic revision of the South African Pettalidae (Arachnida: Opiliones: Cyphophthalmi) based on a combined analysis of discrete and continuous morphological characters with the description of seven new species. *Invertebrate Systematics*. 2010. 24(4): 371-406.
24. de Bivort B. Derivation of large-scale cellular regulatory networks from biological time series data. in *Methods in molecular biology: Systems Biology in Drug Discovery and Development*, Yan Q (ed.). 2010. 662: 149-165.
25. de Bivort B. Cellular-Level Gene Regulatory Networks: Their Derivation and Properties. in *Systems Biology for Signaling Networks*, Choi S (e.d). 2010. 429-446.
26. Bar-Yam Y, Harmon D, de Bivort B. Attractors and democratic dynamics. *Science*. 2009. 323(5917): 1016-1017.
27. de Bivort B, Guo H-F, Zhong Y. Notch signaling is required for activity-dependent synaptic plasticity at the Drosophila neuromuscular junction. *Journal of Neurogenetics*. 2009. 23(4): 395-404.
28. de Bivort B & Perlstein E, Kunes S, Schreiber, S. Amino acid metabolic origin as an evolutionary influence on protein sequence in yeast. *Journal of Molecular Evolution*. 2009. 68(5): 490-497.
29. Perlstein E & de Bivort B, Kunes S, Schreiber, S. Evolutionarily conserved optimization of amino acid biosynthesis. *Journal of Molecular Evolution*. 2007. 65(2): 186-196.
30. de Bivort B, Huang S, Bar-Yam Y. Empirical multiscale networks of cellular regulation. *PLoS Computational Biology*. 2007. 3(10): e207.
31. de Bivort B, Chen C-C, Perretti F, Negro G, Philip T, Bar-Yam Y. Metabolic implications for the mechanism of mitochondrial endosymbiosis and human hereditary disorders. *Journal of Theoretical Biology*. 2007. 248(1): 26-36.
32. Ciupe M, de Bivort B, Bortz D, Nelson P. Estimating kinetic parameters from HIV primary infection data through the eyes of three different mathematical models. *Mathematical Biosciences*. 2006. 200(1): 1-27.
33. de Bivort B. Isotemporal classes of n-gons. *arXiv*. 2005. arXiv:math/05011712005.
34. de Bivort B, Giribet G. A new genus of cyphophthalmid from the Iberian Peninsula with a phylogenetic analysis of the Sironidae (Arachnida: Opiliones: Cyphophthalmi) and a SEM database of external morphology. *Invertebrate Systematics*. 2004. 18(1): 7-52.
35. de Bivort B, Huang, Sui, Bar-Yam Y. Dynamics of cellular level function and regulation derived from murine expression array data. *Proceedings of the National Academy of Sciences USA*. 2004. 101(51): 17687-17692.

Teaching

Harvard departments: *Organismic & Evolutionary Biology (OEB)*, *Molecular & Cellular Biology (MCB)*

- New graduate nanocourse, Practical Introduction to Robotics (MCB 356) January, 2016
- New undergraduate course, Integrated Science (LS 50) spring, fall 2015
- New summer course, CAJAL Advanced Neuro. Prog., Behavior & Neural Systems summer 2015
- New undergraduate laboratory course, Neuroethology (OEB 131) spring 2014, 2015
- Lecturer, Interesting Questions in Eng. & Phys. Biology (MCB 294) fall 2013 - 2015
- Lecturer, Topics in Organismic and Evolutionary Biology (OEB 399) fall 2013 - 2015
- New graduate course, Integrated Science (LS 200) fall 2014
- Lecturer, Biophysics, Brain and Behavior (Biophysics 242r) spring 2013
- Lecturer, Systematics (OEB 181) fall 2010
- Lecturer, New England Complex Systems Institute Summer & Winter Schools 2006-2009
- Lecturer, Middle School Outreach: Behavioral Neuroscience spring 2007
- Teaching Fellow, Topics in Behav. Ecology: Learning & Memory (OEB174) spring 2005
- Teaching Fellow, Systems Biology (MCB195) spring 2005
- Teaching Fellow, HHMI High School Outreach: Behavioral Neuroscience spring 2004

- Teaching Fellow, Genetics and Genomics (BS50) fall 2004
- Took graduate-only pedagogical course (Teaching Biology) senior year, Duke Univ. 2002
- Teaching Assistant, Calculus I, Duke Univ. fall 1999

Graduate Advising

Committee Types: Qualifying Exam (QE), Dissertation Advisory (DA), Dissertation Defense (DD)

Programs: Molecules, Cells, Organisms (MCO), Organismic & Evol. Bio. (OEB), Prog. in Neuroscience (PiN)

• <u>Matt Smith</u>	PhD Advisor		2015 – present
• <u>Jamilla Akhund-Zade</u>	PhD Advisor		2015 – present
• <u>Zach Werkhoven</u>	PhD Advisor		2014 – present
• <u>Jess Kanwal</u>	PhD Co-advisor with Aravi Samuel		2014 – present
• <u>Kyobi Skutt-Kakaria</u>	PhD Advisor		2013 – present
• <u>Liz Kane</u>	PhD Co-advisor with Aravi Samuel		2009 – 2012
• Ambika Kamath	DA	Losos Lab, OEB	2015
• Alex Isakov	QE, DD	Mahadevan Lab, Physics	2015
• Emily Hager	QE	Hoekstra Lab, MCO	2015
• Felix Baier	QE	Hoekstra Lab, MCO	2015
• Mariela Petkova	QE	Engert Lab, Biophysics	2015
• Joe Bell	DD	Wilson Lab, PiN	2015
• Javier Masis	QE	Cox Lab, MCO	2015
• Alexandra Batchelor	QE	Wilson Lab, PiN	2015
• Robert Johnson	QE	Engert Lab, PiN	2015
• Sasha Rayshubskiy	QE, DA	Wilson Lab, PiN	2015
• Jake Peters	QE	Combes Lab, OEB	2015
• William Menegas	QE, DA	Uchida Lab, MCO	2014 – 2015
• Tamsin Jones	QE, DA	Extavour Lab, OEB	2013 – 2015
• Yang Jiang	QE, DA	Kunes Lab, MCO	2013 – 2015
• Kristian Herrera	QE, DA	Engert Lab, MCO	2013 – 2015
• Caitlin Lewarch	QE, DA	Hoekstra Lab, MCO	2013 – 2015
• Hillery Metz	DA, DD	Hoekstra Lab, OEB	2015
• Drago Guggiana-Nilo	QE	Engert Lab, Biophysics	2014
• Katie Boronow	QE	Losos Lab, OEB	2014
• Matt Berck	QE	Samuel Lab, Physics	2014
• Yuqi Qin	DA, DD	Zhang Lab, OEB	2012 – 2013

Service

- OEB Undergraduate Committee 2014 – present
- Program in Neuroscience Graduate Admissions Committee 2015 – present
- OEB Webpage Committee 2015 – present
- MCO Graduate Training Program Journal Club Committee 2013 – present
- Mind Brain Behavior Standing Committee 2013 – present
- Life Science Curriculum Committee 2013 – present
- Leverett House Senior Common Room 2013 – present
- Speaker at “Conversations: Exploring the Basis of Behav & Cogn.,” FAS Campaign event 2015
- Genetics and Genomics Training Program webpage committee 2003 – 2004
- Co-Organizer of departmental Genetics and Genomics Symposium: 2002 – 2003
Species Interactions and Coevolution – joint between MCB and OEB Depts., Harvard

Professional Service & Memberships

- Member, Society for the Study of Evolution 2015 – present
- Scientific Advisor, FlySorter LLC 2015 – present
- Superforecaster, Good Judgement Project 2013 – 2015
- Volunteer interpreter, Boston Museum of Science: Butterfly Hall 2010
- Resident Tutor, Leverett House, Harvard 2004 – 2008

Ad-hoc Reviewer

Nature • *Nature Communications* • *PLoS ONE* • *Cladistics* • *Zoologica Scripta* • *Journal of the Royal Society: Interface* • *Journal of Neuroscience Methods* • *Mathematical Biosciences and Engineering* • *BMC Informatics* • *The European Physical Journal* • Human Frontiers Science Program • Wellcome Trust Postdoctoral Fellowship • Wellcome Trust Dale Fellowship • KU Leuven Interdisciplinary Research Projects Grant • Faculty reader of 5 undergraduate honors theses

Invited Seminars

Janelia Conference: Function of the Insect Central Complex <i>TBA</i>	2016
Society for Neuroscience Meeting <i>Neurobiological and genetic regulation of locomotor individuality</i>	2015
Rockefeller University Neuroscience Seminar Series <i>Genetic and neural circuit control of behavioral individuality</i>	2015
Imperial College London MRC Clinical Sciences Centre Seminar <i>Genetic and neural circuit control of behavioral individuality</i>	2015
Crete Workshop on Neural Circuits and Behavior of <i>Drosophila</i> <i>Neuronal control of behavioral individuality</i>	2015
University of Iceland Life and Environmental Sciences Seminar <i>Genetic and neural circuit control of behavioral individuality</i>	2015
Gordon Research Seminar on Neuroethology Invited faculty representative and session chair	2015
<i>Drosophila</i> Research Conference <i>Navigating the resolution-throughput tradeoff to capture individual behavior</i>	2015
American Physical Society Meeting <i>The neurobiology of individuality</i>	2015
Lehigh University Biological Sciences Fall Colloquium Seminar Series <i>The neurobiology of individuality</i>	2014
Michigan State University Science at the Edge Seminar Series <i>The neurobiology of individuality</i>	2014
ESF-EMBO Symp: Flies Worms & Robots – Minibrains & Behavior <i>A compendium of behavioral motifs in flies, and its shaping by proprioception</i>	2014
Central South Univ., Changsha, China – Research Collaboration Seminar <i>Infrared Fluorescent dyes for the characterization of insect behavior</i>	2014
Neurodevelopmental Behavior Core, Harvard Medical School <i>The neurobiological basis of individuality in Drosophila</i>	2013
Princeton University Biophysics Seminar <i>The neurobiology of individuality</i>	2013
Janelia Conference: Function of the Insect Central Complex <i>A neural circuit controlling locomotor handedness</i>	2012
Harvard Organismic and Evolutionary Biology Seminar Series <i>Phylogenies from morphometrics</i>	2008
Boston Area Graduate Student Symposium <i>Plasticity and polarity elements of the Drosophila phototactic circuitry</i>	2005