

Curriculum Vitae

Björn Brembs

Personal information: Platanenallee 4-6
14050 Berlin, Germany
German National (German father, Swedish mother)
bjoern@brembs.net; <http://brembs.net>

Short profile: Dipl. Biol. (M.Sc.); Dr. rer. nat. (Ph.D.)
Neurobiology of adaptive behavioral choice

Focus: Spontaneous actions and operant learning.

Career sketch:

International undergraduate research projects

Aug-Sep 1993 "Effects of flow regulation, habitat area and isolation on the macroinvertebrate fauna of rapids in north Swedish rivers."
Advisors: Prof. Dr. Björn Malmqvist, Dr. Göran Englund; Umeå, Sweden.

Aug-Sep 1994 "Prior residence, territory quality and life-history strategies in juvenile Atlantic salmon (*Salmo salar* L.)" Advisor: Prof. Dr. Neil Metcalfe; Glasgow, UK

Graduate training

Sep 1996-Mar 2000 Graduate student, Department of Genetics, University of Würzburg (Dr. Martin Heisenberg). Projects:

- Operant and classical conditioning in *Drosophila* at the flight simulator
- Conditioning *Drosophila* with compound stimuli
- The neurobiology of aggression in *Drosophila*

Aug-Sep 1997 "Behavioral Organization in Animals" Social Science Research Council Workshop, University of California, Davis, USA.

Aug 1999 "Mouse Transgenics and Behavior" EMBO and FENS advanced course, Edinburgh, UK. Organizer: Prof. Dr. Richard Morris

Postdoctoral training

Mar 2000-Nov 2003 Department of Neurobiology and Anatomy, University of Texas – Houston Medical School (Dr. John H. Byrne). Projects:

- Neural correlates and mechanisms of operant learning in *Aplysia*
- Extending *Aplysia in vitro* conditioning to include operant and classical components

Independent Researcher

Dec 2003-present Institute of Biology – Neurobiology, Freie Universität Berlin. Selected current projects:

- The genetics of operant and classical components and their interactions in ethologically relevant learning situations
- The neurobiology of spontaneous behavioral variability and its role in operant learning
- Biogenic amines and the control of behavior
- Context generalization and occasion setting in *Drosophila*

Education:

1990	Abitur (baccalaureate) , Wirsberg-Gymnasium Würzburg. Facharbeit (compulsory one-year project): „The ultimate and proximate causations of homing behavior in salmon“
1990/1991	Military service , Hammelburg
1991-1996	Undergraduate studies , Universität Würzburg
1993/1994	Study abroad , University of Umeå, Sweden
1995/1996	Diploma (Master's) thesis , Dipl. Biol. Universität Würzburg, Title: "Operant and classical conditioning in <i>Drosophila</i> at the flight simulator".
1996-2000	Dissertation , Dr. rer. nat. Universität Würzburg, Title: "An analysis of associative learning in <i>Drosophila</i> at the flight simulator"

Positions:

1993-1996	Teaching assistant practical course "Developmental Biology", Department of Zoology I, Universität Würzburg.
1994-1996	Web-Master , Universität Würzburg. Development, installation and maintenance of the homepage for the Biocenter.
Sep 1996-Mar 2000	Graduate student , Department of Genetics, Universität Würzburg
Mar 2000-Dec 2001	PostDoctoral fellow , Department of Neurobiology and Anatomy, University of Texas – Houston Medical School
Jan 2002-Dec 2003	Emmy-Noether fellow of the DFG, Department of Neurobiology and Anatomy, University of Texas – Houston Medical School
Jan 2004-Mar 2004	Guest Researcher , SFB 515, Institute of Biology - Neurobiology, Freie Universität Berlin
Mar 2004-Apr 2006	Independent researcher (DFG), Institute of Biology - Neurobiology, Freie Universität Berlin
Jun 2006-May 2007	Independent researcher (DFG, extended), Institute of Biology - Neurobiology, Freie Universität Berlin
Jun 2007-present	Research Scientist , Institute of Biology - Neurobiology, Freie Universität Berlin

Conference/Symposium Organization:

Sep 1998	Organizer "9 th Neurobiological Graduate Student Workshop" (with Roman Ernst, Stefan Just and Christoph Kleineidam), Würzburg
Jul 2008	Symposium Chair "The neurobiology of choice and decision-making" (with Bernard Balleine), FENS Forum 2008, Geneva, Switzerland

Honors and awards:

Jan 2002-Dec 2003	Emmy-Noether fellow of the DFG
May 2002-present	Member of the Editorial Board of <i>Evolutionary Psychology</i>
Nov 2006-present	Academic editor for <i>PLoS ONE</i>
Jul 2008-present	Associate Editor for <i>J. vis. Exp.</i>
Aug 2008-present	Review Editor for <i>Frontiers in Neuroscience</i>

Research support:

1996-2000	Graduate student position (DFG, PI: Prof. Dr. Heisenberg)
2000-2002	NIH Research Grant (PI: Prof. Dr. Byrne) Title: <i>Analysis of the Neural Control of Behavior</i> Grant number: R01 NS19895 Period of support: Apr 1997 - Nov 2002 Total direct costs: \$859,680
2002-2003	NIH Research Grant (as co-author with Prof. Dr. Byrne) Title: <i>Analysis of the Neural Control of Behavior</i> Grant number: R01 NS19895 Period of support: Dec 2002 - Nov 2003 Total direct costs: \$1,187,500
2002-2003	DFG Emmy-Noether fellowship (66,000€)
2004-2007	DFG Independent Research Fellow Title: <i>Von der Verhaltens- zur Neurophysiologie: Operantes Konditionieren und dessen Wechselwirkungen mit klassischem Konditionieren.</i> Grant numbers: BR 1892/2-1, BR 1892/3-1 Period of support: Mar 2004-Apr 2006, Jun 2006-May 2007 Total direct costs: 182,150€
2005-2008	DFG Research grant Title: <i>The neural basis of operant conditioning in Aplysia</i> Grant number: BR 1892/4-1 Period of support: Dec 2005-Dec 2007 Total direct costs: 20,000€

Professional Societies:

- Society for Neuroscience
- International Society for Neuroethology

Peer-Review:

Outside reviewer for

Journals

- Learning and Memory
- Neuroscience
- Cell and Tissue Research

- Journal of Experimental Biology
- Animal Behavior
- PLoS Biology
- Biological Bulletin
- Behavioural Brain Research
- Journal of Comparative Physiology

Granting bodies

- DFG (Germany)
- BBSRC (UK)

International Organizations

- BIOMAT Consortium - Institute for Advanced Studies of Biosystems

Thesis committees

- Britta Wittek, University of Hamburg

Thesis committees:

2008	Abid Syed Hussaini Jochen Decker
2006	Sabine Schwarz
2005	Bhumika Singh

Search committees:

2007	Search: <u>Assistant Professor, systems neuroscience of invertebrates</u>
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Languages:

- German - native
- Swedish - native
- English - fluent
- French - conversational
- Latin – Latinum

Publications

h-index: 9

Peer-reviewed original research:

1. Cutts C.J.; **Brembs B.**; Metcalfe N.B. and Taylor A.C. (1999): Prior residence, territory quality and life-history strategies in juvenile Atlantic salmon (*Salmo salar* L.). J. Fish. Biol. *55*, 784-794.
2. **Brembs B.** and Heisenberg M. (2000): The Operant and the Classical in conditioned orientation of *Drosophila melanogaster* at the flight simulator. Learn. Mem. *7*, 104-115.
3. **Brembs B.*** and Heisenberg M. (2001): Conditioning with compound stimuli in *Drosophila* at the flight simulator. J. Exp. Biol. *204*, 2849-2859
4. Baier A.; Wittek B. and **Brembs B.*** (2002): *Drosophila* as a new model organism for the neurobiology of aggression? J. Exp. Biol. *205*, 1233-1240.
5. **Brembs B.**; Lorenzetti F.D.; Reyes F.D.; Baxter D.A. and Byrne J.H. (2002): Operant Reward Learning in *Aplysia*: Neuronal Correlates and Mechanisms. Science *296*, 1706-1709.
6. **Brembs B.***; Baxter D.A. and Byrne J.H. (2004): Extending *in vitro* conditioning in *Aplysia* to analyze operant and classical processes in the same preparation. Learn. Mem. *11*, 412-420.
7. Phillips A.M.; Smart R.; Strauss R.; **Brembs B.** and Kelly, L.E. (2005): The *Drosophila black* enigma: the molecular and behavioural characterization of the *black¹* mutant allele. Gene *351C*, 131-142.
8. **Brembs B.*** and Wiener, J. (2006): Context generalization and occasion setting in *Drosophila* visual learning. Learn. Mem. *13*, 618-628
9. **Brembs, B.*** and Hempel de Ibarra, N. (2006): Different parameters support discrimination and generalization in *Drosophila* at the flight simulator. Learn. Mem. *13*, 629-637
10. Maye, A.; Hsieh, C.; Sugihara, G. and **Brembs, B.*** (2007): Order in spontaneous behavior. PLoS One *2*: e443
11. **Brembs, B.**; Christiansen, F.; Pflüger, H.J. and Duch, C. (2007): Flight initiation and maintenance deficits in flies with genetically altered biogenic amine levels. J. Neurosci. *27*, 11122-11131
12. **Brembs, B.*** (2008): Operant learning of *Drosophila* at the torque meter. J. vis. Exp. *16*. <http://www.jove.com/index/Details.stp?ID=731>, doi: 10.3791/731
13. **Brembs, B.*** and Plendl, W. (2008): Double dissociation of PKC and AC manipulations on operant and classical learning in *Drosophila*. Curr. Biol. *18*(15):1168-1117.
14. **Brembs, B.*** (2008): Mushroom-bodies mediate hierarchical interactions between operant and classical learning systems in *Drosophila* visual learning. J. Neurosci. Re-subm.
15. **Brembs, B.*** and Maye, A. (2008): Analyzing the temporal structure of spontaneous yaw torque behavior in *Drosophila*. J. vis. Exp. subm.

Review articles:**Invited Reviews**

1. **Brembs B.*** (2003): Operant conditioning in invertebrates. *Curr. Opin. Neurobiol.* *13*, 710-717.
2. **Brembs B.*** (2003): Operant reward learning in *Aplysia*. *Curr. Dir. Psychol. Sci.* *12*, 218-221.
3. **Brembs B.*** (2008): The importance of being active. *J. Neurogen. Spec. Issue. In prep.*

Reviews

4. **Brembs B.*** (1996): Chaos, cheating and cooperation: potential solutions to the Prisoner's Dilemma. *OIKOS* *76*, 14-24.
5. Heisenberg M.; Wolf R. and **Brembs B.** (2001): Flexibility in a single behavioral variable of *Drosophila*. *Learn. Mem.* *8*, 1-10
6. **Brembs B.*** (2008): Brains as output/input systems. *In prep.*

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Book Chapters:

1. **Brembs B.** (2001): Hamilton's Theory. In: Brenner, S. and Miller, J. (eds) Encyclopedia of Genetics, Academic Press, London, New York; pp. 906-910.
2. Menzel R.; **Brembs, B.** and Giurfa M. (2006): Cognition in Invertebrates. In: Kaas, J.H. (ed.) Evolution of Nervous Systems. Chapter No. 1.26. Academic Press, Oxford; pp. 403-422
3. **Brembs B.** (2008): Operant conditioning. In: Windhorst, U. Binder, M.D. and Hirokawa, N. (eds) Encyclopedia of Neuroscience. Springer, Berlin Heidelberg. *In press.*

Popular Science Articles:

1. **Brembs, B** (2008): Spontaneous actions and habitual responses in fruit flies. *The Naked Scientists*, BBC Radio, <http://nakedscientists.com>, *in press*

Talks and Presentations:**Invited Presentations:**

1. **02 May, 2002:** Operant reward learning in *Aplysia*, Lecture Series "Neurogenetics", Universität Würzburg, Germany
2. **19-23 July, 2004:** Discussant, Novartis Foundation Symposium No. 268 on "Molecular Mechanisms Influencing Aggressive Behaviours." London, England, UK.
3. **17-22 September, 2006:** Brains as Output/Input Devices. XIII Summer School, Nicolás Cabrera Institute: "Biophysics of Biological Circuits: from Molecules to Networks." Universidad Autónoma de Madrid, Spain.
4. **15/16 January, 2007:** Brains as Output/Input Systems. Symposium in Molecular Neurobiology, Friedrich Miescher Institute, Basel, Switzerland.

5. **13-15 March, 2007:** Brains as Output/Input Systems. Janelia Farm Conference: "Insect Behavior: Small Brains, Big Functions", Janelia Farm Research Campus, USA
6. **05-09 June, 2007:** Aplysia as an attractive alternative for analyzing agency? "Gastropod Neuroscience: Past Successes and Future Prospects." University of Washington, Friday Harbor Labs, San Juan Island, USA
7. **21 October, 2007:** The generation effect in flies. Monthly Berlin meeting, BiologieNetz.de, Berlin, Germany
8. **23 October, 2007:** Order in the spontaneous behavior of *Drosophila*. Interdisciplinary lecture series "Irreversible Processes and Self-Organization", Institut für Physik, Humboldt Universität zu Berlin, Germany.
9. **21 November 2007:** Genetic dissection of learning-by-doing in *Drosophila*. ALeR-GiC Seminar Series, University of Sussex, Brighton, UK.
10. **27 November 2007:** Dissecting learning-by-doing in *Drosophila*. Symposium in Systems Neuroscience, Ludwig-Maximilians Universität München, Munich, Germany.
11. **08/09 January 2007:** Neurogenetic dissection of learning-by-doing in *Drosophila*. Symposium "Molecular Neurobiology of Behavior", Georg-August-Universität Göttingen, Germany
12. **14 February 2008:** PLoS One/SciVee: Scientific Video-Publication. Mediaforum "Videokommunikation in Biotechnology", IWF Wissen und Medien gGmbH, Göttingen, Germany
13. **03.-06.05.2008:** The molecular basis and hierarchical organization of predictive learning in *Drosophila*. CIN Selection Symposium, Werner Reichardt - Center für integrative Neurowissenschaften, Tübingen, Germany
14. **11.06.2008:** The molecular basis and hierarchical organization of adaptive behavioral choice in *Drosophila*. BMC Neuroscience Seminars, Uppsala Biomedicinska Centrum, Uppsala University, Uppsala, Sweden
15. **24.-26.11.2008:** Learning the consequences: state-dependent modulation of spontaneous decisions in flies. Simple Cognitive Systems, Gatsby Charitable Foundation workshop, London, UK.

Conference Presentations:

16. **Brembs B.;** Wolf R.; Heisenberg M. (1997): Is operant behavior facilitating classical conditioning of *Drosophila* at the flight simulator? In: Elsner N, Waessle H (eds) Göttingen Neurobiology Report 1997. Georg Thieme Verlag Stuttgart, New York: 652.
17. Wolf R.; **Brembs B.;** Ernst R. and Heisenberg M. (1998): Classification of learning in tethered flying *Drosophila*. In: Elsner N and Wehner R (eds) New Neuroethology on the Move. Georg Thieme Verlag Stuttgart, New York: 111 ([talk](#))
18. **Brembs B.;** Wolf R. and Heisenberg M. (1998): How different are operant and classical conditioning at the flight simulator? 5th International Congress of Neuroethology, San Diego, Ca.

19. **Brembs B.**; Wolf R. and Heisenberg M. (1998): Operant and Classical Learning at the Flight Simulator: What is the Role of the Context? In: Elsner N and Wehner R (eds) *New Neuroethology on the Move*. Georg Thieme Verlag Stuttgart, New York: 514.
20. **Brembs B.**; Wolf R. and Heisenberg M. (1999): Classical Questions in an Operant Learning Paradigm. In: Elsner N and Eysel U (eds) *Göttingen Neurobiology Report 1999*. Georg Thieme Verlag Stuttgart, New York: 545.
21. Baxter D.A.; Cai Y.; **Brembs B.** and Byrne J.H. (2000): Simulating physiological and morphological properties of neurons with SNNAP (Simulator for Neural Networks and Action Potentials). *Soc. Neurosci. Abstr.* 26:21.64.
22. **Brembs B.**; Wilkinson E.; Reyes F.; Baxter D.A. and Byrne J.H. (2001): Operant conditioning using self-stimulation in *Aplysia*. In: Kreutzberg GW and Elsner N (eds) *Göttingen Neurobiology Report 2001*. Georg Thieme Verlag Stuttgart, New York
23. Baxter D.A.; **Brembs B.** and Byrne J.H. (2001): Operant conditioning of feeding behavior in *Aplysia*. *Cold Spring Harbor Symposium on Learning and Memory*.
24. **Brembs B.**; Wilkinson E.; Reyes F.; Baxter D.A. and Byrne J.H. (2001): Operant conditioning of feeding behavior in *Aplysia* using self-stimulation. *Soc. Neurosci. Abstr.* 644.19
25. **Brembs B.**; Wilkinson E.; Reyes F.; Baxter D.A. and Byrne J.H. (2001): Operant conditioning of feeding behavior in *Aplysia*. 6th International Congress of Neuroethology, Bonn, Germany.
26. Evans C.G; Jing J.; Proekt A., **Brembs B.**; Rosen S. and Cropper E.C. (2003): Frequency-dependent regulation of afferent transmission in the feeding circuitry of *Aplysia*. *Soc. Neurosci. Abstr.* 604.1.
27. **Brembs B.**; Baxter D.A. and Byrne J.H. (2004): Extending *in vitro* conditioning in *Aplysia* to analyze operant and classical processes in the same preparation. 7th International Congress of Neuroethology, Nyborg, Denmark.
28. Carbon, C.C.; Leder, H.; Weber, J.; Sander, T.; Trahms, L.; Grueter, M.; Grueter, T.; **Brembs, B.** and Lueschow, A. (2004): Specific impairments of configural processing in prosopagnosics. *Soc. Neurosci. Abstr.*, 200.23.
29. **Brembs, B.**; Maye, A. and Greggers, U. (2005): Order in spontaneous behavior. *Soc. Neurosci. Abstr.*, 754.2.
30. Wiener, J.; Gerber, B.; Hempel de Ibarra, N.; Menzel, R. and **Brembs, B.** (2005): Occasion setting in *Drosophila* at the flight simulator. *Soc. Neurosci. Abstr.*, 777.9
31. **Brembs, B.**; Hsieh, C.; Sugihara, G. and Maye, A (2006): Do fruit flies have free will? *FENS Abstr.*, vol.3, A233.7
32. Christiansen, F.; Pflüger, J.; Duch, C.; and **Brembs, B.** (2006): Profound flight performance deficit in *Drosophila* lacking octopamine. *FENS Abstr.*, vol.3, A218.2
33. **Brembs, B.** (2006): Operant and classical components interact hierarchically in *Drosophila* predictive learning. *Soc. Neurosci. Abstr.*, 813.26
34. **Brembs, B.**; Maye, A; Hsieh, C. and Sugihara, G. (2007): Do fruit flies have free will? 8th International Congress of Neuroethology, Vancouver, Canada

35. **Brembs, B.** (2007): Mushroom-bodies regulate habit formation in *Drosophila*. 8th International Congress of Neuroethology, Vancouver, Canada
36. **Brembs, B.**; Christiansen, F.; Pflüger, H.J. and Duch, C. (2007): Flight motor performance deficits in flies with genetically altered biogenic amine levels. Soc. Neurosci. Abstr., 453.9 ([talk](#))
37. **Brembs, B.** (2008): Neurogenetic dissection of learning-by-doing in *Drosophila*. Gordon Research Conference "Genes & Behavior", Barga, Italy
38. **Brembs, B.** (2008): Mushroom-bodies regulate habit formation in *Drosophila*. FENS Abstr. ([talk](#))
39. **Brembs, B.** (2008): Double dissociation of protein-kinase C and adenylyl cyclase manipulations on operant and classical learning in *Drosophila*. 12th European *Drosophila* Neurobiology Conference, Würzburg, Germany
40. **Brembs, B.** (2008): Adenylyl cyclase and PKC differentiate operant and classical learning in *Drosophila*. Soc. Neurosci. Abstr., 792.12

Teaching experience

Basic studies:

Basic lectures (Berlin)

WS 2007/2008 *Animal physiology*. ca. 200 participants
Introductory Biology, ca. 200 participants

Practical courses (Berlin)

WS 2007/2008 *Neurobiology*: Basic course with seminar. 20-30 participants

Practical courses as student teaching assistant (Würzburg)

SS 1993-2000 *Developmental Biology*

Advanced studies:

Practical courses (Berlin)

SS 2008 *Cellular analysis of behavior and neuranatomical methods: Insects*, 12 participants

Advanced lectures (Berlin)

WS 2004/2005 *Neurobiology*: (1) Learning and memory, basic mechanisms. (2) Emotional learning. 30-40 participants

WS 2005/2006 *Neurobiology*: (1) Mathematical modeling and the analysis of intracellular signaling. (2) The biology of individuality. 30-40 participants

Seminars (Berlin)

WS 2004/2005 *Neurobiology*. Student presentations. 30-40 participants

WS 2005/2006 *Neurobiology*. Student presentations. 30-40 participants

Exercises (Würzburg)

SS 1999 *Exercises in Genetics* (lecture, exercises and exam, Würzburg, substituting for Prof. Dr. Heisenberg, no supervision). 20-30 participants

Practical courses as student teaching assistant (Würzburg)

WS 1995-2000 *Advanced practical course I in Genetics*
Advanced practical course II in Genetics

Supervision:**Undergraduate students**

- 1999 **Andrea Baier, Britta Wittek** (Würzburg): *Drosophila as a new model for the neurobiology of aggression?*
- 1999/2000 **Jan Wiener**, (Würzburg): *Kontext-Generalisierung in Drosophila melanogaster.*
- 2001 **Elizabeth Wilkinson** (Houston): *Operant Reward Learning in Aplysia: Neuronal Correlates and Mechanisms.*
- 2002 **Vu Hyun** (Houston): *Extending In Vitro Conditioning in Aplysia to Analyze Operant and Classical Processes in the Same Preparation.*
- 2003 **Hyun Park** (Houston): *Frequency-dependent regulation of afferent transmission in the feeding circuitry of Aplysia.*
- 2006/2007 **Frauke Christiansen** (Berlin): *Flight motor performance deficits in flies with genetically altered biogenic amine levels.*

Graduate students

- 2001/2002 **Fredy D. Reyes, Fred D. Lorenzetti** (Houston): *Operant Reward Learning in Aplysia: Neuronal Correlates and Mechanisms.*

Post-Docs

- 2004-2007 **Alexander Maye** (Berlin): *Order in spontaneous behavior.*

Teaching statement

I think that students need to engage as many parts of their brains as possible as they study biology at the undergraduate and graduate levels. This obviously entails storing information in hippocampus and neocortex by reading text books and attending lectures. However, especially the current generations of students are often unfamiliar with the concept of showing initiative, instead of passively assimilating knowledge. Therefore, the students' non-hippocampal brain areas also need to be activated by applying their newly acquired knowledge spontaneously. It is essential that students participate in laboratory exercises, small group discussions and presentations. As an Assistant Professor, it is my responsibility to stir initiative and curiosity in students where the potential for these qualities is discernible and to nurture them where they are still in their embryonic stage.

In addition to my specialty neurobiology I am proficient in teaching classes and courses in genetics, development, physiology and ecology at both the undergraduate and graduate levels. I am also interested in community outreach. In particular, I hope to bring local high school science teachers into the lab (for an afternoon visit or a summer) to experience research first hand, and thereby, to enrich and enliven their teaching abilities.

Already as an undergraduate, I enjoyed assisting courses and have been able to recruit students for research projects when I continued teaching as an undergraduate. My publication on aggression in *Drosophila* is the result of such a successful teaching episode. Since my graduate studies I have been in charge of designing and carrying out courses and lectures. I believe that this experience will make me a valuable teacher at any institution.

In addition, I frequently train new laboratory members in various aspects of laboratory procedures ranging from making solutions to animal dissection and basic electrophysiology. I also fill the position as statistical advisor in our department.

Through these activities I have earned a reputation for being a patient and thorough instructor. I enjoy teaching very much and hope to obtain a position in which I can help students gain an appreciation for the scientific processes involved in the collection and evaluation of new knowledge.