

Curriculum Vitae
E. Jane Albert Hubbard

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Education:

Doctor of Philosophy in Genetics and Development, Columbia University, July 1993.
Master of Arts in Genetics and Development, Columbia University, February 1990.
Master of Science in Zoology, University of Hawaii, May 1987.
Bachelor of Arts in Biology, cum laude, Cornell University, January 1981.

Grants and Fellowships:

Pending: March of Dimes Research Grant

Awarded:

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| 2005-2009 | National Institutes of Health R01 GM061706 |
| 2003-2007 | National Institutes of Health R24 GM066969 GLUE grant (submitting PI, for tri-institutional award with five total co-PIs) |
| 2000-2005 | National Institutes of Health R01 GM061706 (awarded with score in 1.6%) |
| 2001-2002 | NSF (Course Curriculum and Laboratory Improvement, Adaptation and Implementation) "Discovery-based Laboratory in Genetics" |
| 2000-2001 | Curricular Development Challenge Fund (NYU) "Laboratory in Genetics: a Locus for Discovery" |
| 1999-2001 | March of Dimes Basil O'Connor Starter Scholar Research Award |
| 1996-1997 | Howard Hughes Medical Institute Postdoctoral Research Associate |
| 1993-1996 | Damon Runyon-Walter Winchell Cancer Research Fund Postdoctoral Fellowship |
| 1989-1991 | NCI Predoctoral Training Grant in Cancer Biology |
| 1985-1987 | East-West Center Scholarship for MS in Zoology |

Awards:

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| 2003 | Golden Dozen Award, College of Arts and Sciences, New York University (teaching award) |
| 1993 | Samuel W. Rover and Lewis Rover Award in Genetics and Development, Columbia University (departmental thesis award) |

Professional Experience:

- 1998-2005 Assistant Professor Department of Biology, New York University. Genetic and molecular studies of *C. elegans* gonadogenesis.
- 1993-1997 Postdoctoral Research Fellow Advisor: Dr. Iva Greenwald, Department of Biochemistry and Molecular Biophysics, Columbia University. Effectors of *lin-12* and gonadogenesis in *Caenorhabditis elegans*.
- 1988-1993 Graduate Student Advisor: Dr. Marian Carlson, Department of Genetics and Development, Columbia University. Dissertation Title: Multicopy suppressors of defects caused by loss of SNF4, a protein kinase activator.
- Dec. 1987-
Aug. 1988 Research Assistant Supervisor: Dr. Gary Struhl, Department of Genetics and Development, Columbia University. Studies of genes regulating early *Drosophila* patterning.
- Apr. 1987-
Nov. 1987 Research Assistant Supervisor: Dr. Corey Goodman, Department of Biological Sciences, Stanford University. Molecular genetic studies of the *Drosophila* laminin gene.
- 1985-1987 Master's research Advisor: Dr. Michael G. Hadfield, Department of Zoology, University of Hawaii. Larval life and metamorphosis of an Hawaiian gastropod, *Hypselodoris infucata*.
- 1982-1985 Biologist US Peace Corps/Governments of Western Samoa and Fiji. Research on prawn and green mussel culture methods.
- 1981-1982 Research Assistant Supervisor: Dr. William N. McFarland, Section of Ecology and Systematics, Cornell University. Collection and analysis of data on behavior of reef fish. West Indies Laboratory, St. Croix, USVI.

Publications

(note: PubMed search finds my publications with “**Hubbard EJ**”; selected recent papers include short explanatory information)

E. J. A. Hubbard: “Model organisms as powerful tools for biomedical research” *in*: Science without Laws: Model systems, cases and exemplary Narratives. Angela N. H. Creager, Elizabeth Lunbeck, and M. Norton Wise, Eds. Duke University Press (in press)

E. J. A. Hubbard and D. Greenstein, Introduction to the germ line (September 1, 2005), *WormBook*, ed. The *C. elegans* Research Community, WormBook, doi/10.1895/wormbook.1.18.1, <http://www.wormbook.org>

J. Fisher, D. Harel, **E. J. A. Hubbard**, N. Piterman, M. J. Stern and N. Swerdlin, 2005. Combining State-Based and Scenario-Based Approaches in Modeling Biological Systems. Chapter in: Title: Computational Methods in Systems Biology: International Conference

CMSB 2004, Paris, France, May 26-28, 2004, Revised Selected Papers, *Lecture Notes in Computer Science* Volume 3082 Publisher: Springer-Verlag GmbH

This paper proposes advantages of combining state-based and scenario-based approaches to modeling biology as a means to test experimental results against models of system behavior.

J. Maciejowski, J. H. Ahn, D. J. Killian, P. G. Cipriani, A. L. Chaudhary, J. I. Lee, R. Voutev, R. C. Johnsen, D. L. Baillie, K. C. Gunsalus, D. H. A. Fitch, and **E. J. A. Hubbard**, 2005. Autosomal genes of autosomal/X-linked duplicated gene pairs and germline proliferation in *C. elegans*. *Genetics* 169:1997-2011.

This paper reports cloning of three genes based on three alleles found in a screen for mutants with early germline proliferation defects. Analysis of these genes lend unexpected insight into a germline/soma functional separation of paralogous autosomal/X-linked gene pairs. We present hypotheses for evolutionary mechanisms that may underlie germline/soma subfunctionalization of duplicated genes, taking into account the role of X-chromosome silencing in the germ line and analogous mammalian phenomena.

D. J. Killian and **E. J. A. Hubbard**, 2005. *C. elegans* germline patterning requires coordinated development of the somatic gonadal sheath and the germ line. *Developmental Biology* 279:322-335.

Evidence that specific somatic gonadal cells of sheath lineage influence amplification, differentiation, and the potential for tumor formation in the germ line is presented in this paper by way of time-course analysis and cell ablation studies in multiple genetic backgrounds. This study underscores the importance of strict developmental coordination between neighboring tissues. We discuss these results in the context of mechanisms that may underlie tumorigenesis in other organisms.

J. Fisher, N. Piterman, **E. J. A. Hubbard**, M. Stern, D. Harel, 2005. Computational insights into *C. elegans* vulval development. *Proc. Natl. Acad. Sci. USA* 102:1951-1956.

The visual formalism of *statecharts* is used to formalize Sternberg and Horvitz' 1989 model for vulval fate specification. The construction and execution of the model highlights the importance of temporal restrictions in biological processes.

HIGHLIGHT IN NATURE REVIEWS GENETICS, APRIL 2005

D. J. Killian and **E. J. A. Hubbard**, 2004. *C. elegans pro-1* activity is required for soma/germline interactions that influence proliferation and differentiation in the germ line *Development* 131, 1267-1278.

This paper introduces *pro-1*, a member of a highly conserved subfamily of WD-repeat proteins that is required non-autonomously (in the sheath/spermatheca lineage of the somatic gonad) for proper establishment of the proliferation/differentiation pattern in the germ line.

SELECTED BY FACULTY OF 1000

D. Hansen, **E. J. A. Hubbard** and T. Schedl, 2004. Multi-pathway control of the proliferation versus meiotic development decision in the *Caenorhabditis elegans* germline, *Developmental Biology*, 268:342-357.

Genetic and time course studies reported in this paper suggest that a third pathway, parallel to the GLD-1 and GLD-2 pathways, promotes meiotic development.

N. Kam, D. Harel, H. Kugler, R. Marely, A. Pnueli, **E.J.A Hubbard**, and M.J. Stern, 2003. "Formal Modeling of *C. elegans* Development: A Scenario Based Approach", G.Ciobanu

(Ed.): Modeling in Molecular Biology, Natural Computing Series, Springer. (extension of previous meetings proceedings paper)

We use the recently developed methodology consisting of the language of live sequence charts with the play-in/play-out process, to model the well-characterized process of cell fate acquisition during *C. elegans* vulval development.

A.S.-R. Pepper, T.-W. Lo, D. J. Killian, D. Hall and **E. J. A. Hubbard**, 2003. The establishment of *C. elegans* germline pattern is controlled by overlapping proximal and distal somatic gonad signals *Developmental Biology* 259:336-350.

Results reported in this paper indicate that several distinct anatomical sources of LAG-2 in the larval somatic gonad functionally overlap to promote proliferation and prevent early meiosis in the germ line.

E. J. A. Hubbard and Renee Reijo Pera, 2003. A germ-cell odyssey: fate, survival, migration, stem cells and differentiation - Meeting on Germ Cells. *Embo Reports* 4:352-357.

Meeting report for 2002 "Germ cells" meeting held at Cold Spring Harbor in October, 2002

N. Kam, D. Harel, H. Kugler, R. Marelly, A. Pnueli, **E.J.A Hubbard**, and M.J. Stern, 2003. "Formal Modeling of *C. elegans* Development: A Scenario Based Approach". Proc. 1st International Workshop on Computational Methods in Systems Biology (CMSB03), LNCS 2602, pp. 4-20, Rovereto, Italy, February 2003 (published as part of the Springer "Lecture Notes in Computer Science" (LNCS) series)

See Kam et al., 2003, above, for expanded version of this paper

B. Mishra, R. Daruwala, Y. Zhou, N. Ugel, A. Policriti, M. Antoniotti, S. Paxia, M. Rejali, A. Rudra, V. Cherepinsky, N. Silver, W. Casey, C. Piazza, M. Simeoni, P. Barbano, M. Spivak, J-W. Feng, O. Gill, M. Venkatesh, F. Cheng, B. Sun, I. Ioniata, T.S. Anantharaman, **E.J.A. Hubbard**, A. Pnueli, D. Harel, V. Chandru, R. Hariharan, M. Wigler, F. Park, S.-C.. Lin, Y. Lazebnik, F. Winkler, C. Cantor, A. Carbone, and M. Gromov, 2003. "A Sense of Life: Computational & Experimental Investigations with Models of Biochemical & Evolutionary Processes", *OMICS - A Journal of Integrative Biology*, (Special Issue on BioCOMP, Ed.: S. Kumar) 7(3): 253-268.

A.S.-R. Pepper, D. J. Killian and **E. J. A. Hubbard**, 2003. Genetic analysis of *Caenorhabditis elegans glp-1* mutants suggests receptor interaction or competition. *Genetics* 163: 115-132.

This paper details analysis of three mutations that represent a new genetic and phenotypic class of *glp-1/Notch* mutants, *glp-1(Pro)*. Our results support a model for a higher-order receptor complex and/or competition among receptor proteins for limiting factors that are required for proper regulation of receptor activity. Double-mutant analysis further suggests that the functional defect in *glp-1(Pro)* mutants occurs prior to or at the level of ligand interaction.

E.J.A. Hubbard and D. Greenstein, 2000. The *C. elegans* gonad: a test tube for cell and developmental biology (review). *Developmental Dynamics* 218:2-22

G. Wu, **E.J.A. Hubbard**, J. Kitajewski, and I. Greenwald, 1998. Evidence for functional and physical association between *Caenorhabditis elegans* SEL-10, a Cdc4p-related protein, and SEL-12 presenilin. *Proc. Natl. Acad. Sci. USA* **95**:15787-15791.

E.J.A. Hubbard, G. Wu, J. Kitajewski, and I. Greenwald, 1997. *sel-10*, a negative regulator of *lin-12* activity in *Caenorhabditis elegans*, encodes a member of the CDC4 family of proteins. *Genes and Development* **11**:3182-3193.

E.J.A. Hubbard, C. Dong, and I. Greenwald, 1996. Evidence for physical and functional association between *lin-12* and *emb-5* in *C. elegans*. *Science* **273**:112-115.

E.J.A. Hubbard and M. Carlson, 1995. Protein Kinase Factsbook: entries on SNF1 and YCK1/2 protein kinases. D.G. Hardie and S. Hanks, eds. Academic Press, London, pp. 174-175 and pp. 350-352.

E.J.A. Hubbard, R. Jiang, and M. Carlson, 1994. Dosage-dependent modulation of glucose repression by MSN3 (STD1) in *Saccharomyces cerevisiae*. *Mol. Cell. Biol.* **14**:1972-1978.

X. Yang, **E.J.A. Hubbard**, and M. Carlson, 1992. A protein kinase substrate identified by the two-hybrid system. *Science* **257**:680-682.

L.C. Robinson, **E.J.A. Hubbard**, P.R. Graves, A.A. DePaoli-Roach, P.J. Roach, C. Kung, D.W. Haas, C.T. Hagedorn, M. Goebel, M. Culbertson, and M. Carlson, 1992. Yeast casein kinase I homologues: an essential gene pair. *Proc. Natl. Acad. Sci. USA* **89**: 28-32.

E.J.A. Hubbard, X. Yang and M. Carlson, 1992. Relationship of the cAMP-dependent protein kinase pathway to the SNF1 protein kinase and invertase expression in *Saccharomyces cerevisiae*. *Genetics* **130**:71-80.

E.J.A. Hubbard, 1988. Larval growth and the induction of metamorphosis of a tropical sponge-eating nudibranch. *J. Molluscan Studies* **54**(3):259-270.

Manuscripts Submitted:

J. Maciejowski, N. Ugel, B. Mishra, M. Isopi and **E.J.A Hubbard**. Quantitative analysis of germline mitosis in *C. elegans*

R. Voutev, D. J. Killian, J. H. Ahn, and **E.J.A Hubbard**. Alterations in ribosome biogenesis cause specific defects in *C. elegans* hermaphrodite gonadogenesis

Invited Lectures:

Seminars – upcoming

MD Anderson, Texas Medical Center. March, 2006

Mount Sinai School of Medicine. December, 2005

University of Pittsburgh. October 17, 2005

Seminars – since 2001

Harvard University, Department of Systems Biology, April 15, 2005 “Experimental & Computational Approaches to *C. elegans* Development”

Emory University School of Medicine, April 18, 2005 & Georgia Institute of Technology, The Wallace H. Coulter Department of Biomedical Engineering, April 19, 2005 “Experimental & modeling studies on the control of proliferation and differentiation in the *C. elegans* germ line”

Syracuse University, Department of Biology, November 5, 2004 “Soma/germline interactions and germline development in *C. elegans*.”

Institute for Systems Biology, November 3, 2004 “Cell-cell interaction during development: developmental genetics meets system design”

New York University, Department of Biology September 27, 2004. “How does a germ line grow? Genetic and computational approaches to *C. elegans* Development”

UMDNJ, Department of Molecular Biology, September 21, 2004 “Proliferation, Differentiation, and tumor formation: roles of the developing gonadal sheath in patterning the *C. elegans* germ line.”

Rockefeller University, March 24, 2004. “Soma-germline interactions during *C. elegans* development” Clinical Seminar series

Weizmann Institute of Science, Rehovot, Israel. Faculty of Mathematics and Computer Science Seminar June 10, 2003 “Understanding the Biology of the Worm *C. elegans*” Michael Stern and Jane Hubbard Yale University and New York University, resp. (joint seminar)

Vanderbilt University Medical Center, Department of Cell and Developmental Biology, February 24, 2003 “Gonadogenesis and Germline Proliferation in *C. elegans*.”

University of Connecticut Health Center, Department of Genetics and Developmental Biology, (co-presented with Michael Stern, Yale University) August 9, 2002 “Modeling *C. elegans* Development Using Object-Oriented Modeling Tools Developed for Analyzing the Behavior of Complex Reactive Systems”

Queens College, November 28, 2001 “Germ cell differentiation in *C. elegans*” Queens College, Flushing, NY.

Sloan-Kettering Institute, Rockefeller University; Developmental Biology Course (guest lecture in course organized by Lee Niswander, Ulrike Gaul and Kathryn Anderson) October 3, 2001 “*C. elegans* patterning”

Meetings, conferences, and workshops

Oral presentations (since 1999):

New York University Courant/Biology Exchange series. July 27, 2005 “Modeling Developmental Systems”

15th International *C. elegans* Meeting. University of California at Los Angeles
June 25 - 29, 2005 A computational model of vulval fate specification. Na'aman Kam,
David Harel, Amir Pnueli, Hillel Kugler, Michael J. Stern, E. Jane Albert Hubbard
(selected for Plenary presentation, presented by N. Kam)

First International Workshop on Realistic Modeling of Biological Systems May 2-6, 2005
“Developmental Biology and Realistic Modeling” Hotel Mizpe Hayamim, Galilee, Israel

New York Area Worm Meeting. December 2, 2004 “Proliferation, differentiation, and
tumor formation: the gonadal sheath and patterning of the *C. elegans* germ line”

East Coast Worm Meeting, New Haven, CT June 11-13, 2004. Robust germline
amplification and the precise timing of initial meiosis are dependent upon interactions with
specific cells of the developing gonadal sheath. Darrell J. Killian, E. Jane Albert Hubbard.
(presented by DJ Killian)

3rd Annual Symposium of the Center for Comparative Functional Genomics, New York
University. April 30, 2004. Patterns and Networks in Genomes. “Modeling *C. elegans*
Developmental Networks: System Design Meets Biology” Organized by NYU
Department of Biology & Courant Institute

New York University Scholars Lecture Series. November 19, 2003. "The Many Faces of
'Model Organisms' in Research in Biology: *C. elegans* Developmental Genetics and
Beyond,"

14th International *C. elegans* meeting, Los Angeles, CA “Using *C. elegans* in the classroom”
July 1, 2003; Teaching workshop II – presentation

National Institutes of Health (NICHD), May 12, 2003 Special Research Focus Group
Meeting, Male Reproduction. “Meiotic onset in *C. elegans*”

Germ Cells Meeting, Cold Spring Harbor Laboratories, NY, October 9-13, 2002. Temporal
and spatial control of meiotic onset.

East Coast Worm Meeting, Durham, NH, June 14-16, 2002 Temporal and
spatial control of initial meiotic entry in the *C. elegans* germ line. (presented by A. Pepper)

Celebrating recent advances in science 2000-2001: “Development of the *C. elegans* germ
line” New York University, March 17, 2001 (as a result of this lecture, my laboratory

worked with two high school teachers to implement experiments with *C. elegans* in high school biology classes at the United Nations School)

Sunday at the Square series, New York University College of Arts and Science March 4, 2001 “Genetics in biology and modern medicine”

East Coast Worm Meeting. Atlanta, GA 2000. *glp-1* proximal proliferation (Pro) mutants. Te-Wen Lo and E.J.A. Hubbard (presented by T.-W. Lo)

New York Area Worm Meeting, February 28, 2000 “Mutations that perturb germline development: work in progress” New York University

Princeton Workshops in the History of Science 1999-2000: Model systems, cases and exemplary narratives. October 2, 1999 Commentator on “Model Organisms as Case-based Reasoning: Worms in Contemporary Biomedical Science” by Rachel Ankeny, Princeton, NJ.

Skirball Institute NYU Medical Center, June 16, 1999 Developmental Genetics symposium (Developmental Genetics Program)

Meeting Service:

Co-Organizer: Workshop for International Worm Meeting Los Angeles, June 29-July 3, 2003. Workshop title: “Mathematical and computer modeling of *C. elegans* biology.” Description: workshop to present/discuss mathematical and computational approaches to modeling the "behavior" of various aspects of *C. elegans* biology, including (but not limited to) analyses of development, neuronal control of behavior, physiology, cis-regulatory gene networks, intracellular pathways and network structure. Co-organized with Dr. Michael Stern, Yale University.

Co-organizer: “New York Area Worm Meetings” For meetings held at NYU (1998-2001), coordinated funding and hosted. Meetings held at the Rockefeller University since November 2002. Meetings held 2x/year, 3-4 speakers each from area (New Haven – New York – New Jersey – Philadelphia. See: <http://www.nyu.edu/classes/hubbard/NYAWM.html>

Session chair:

- First International Workshop on Realistic Modeling of Biological Systems May 2-6, 2005 Mizpe Hayamim, Galilee, Israel
- 14th International *C. elegans* meeting, Los Angeles, CA June 29-July 3, 2003
- East Coast Worm Meeting, Atlanta, GA June 9-11, 2000

Teaching/course development:

Course developed and implemented – Undergraduate

Course title: Laboratory in Genetics (first offered Spring, 2000)

see: <http://www.nyu.edu/classes/hubbard/V23.0031info.html>

Course developed and implemented – Graduate

Course title: Advanced Genetics (first offered, Spring 1999)

see: <http://www.nyu.edu/classes/hubbard/G23.1126info.html>

Other teaching – selected lectures

Undergraduate: Molecular and Cell Biology, Principles of Biology

Graduate: Molecular Genetics, Developmental Genetics Foundations Course I & II,
Molecular controls of organism form and function.

Advisement:

Post-Doctoral: Hillel Kugler, Ph.D. Weizmann Inst.

David Michaelson, Ph.D. UCLA

Graduate: Anita S.-R. Pepper, Ph.D. (currently postdoctoral fellow at University of
Pennsylvania in laboratory of T. Jongens)

Darrell J. Killian, Ph.D. (currently postdoctoral fellow at University of
Colorado in laboratory of D. Xue)

Roumen Voutev: current Ph.D. candidate

Masters degree students mentored: total of 12 (2 current).

Committee/examiner for a total of 27 Ph.D. candidates (NYU Biology plus outside)

Undergraduate: over 10, including 4 summer HHMI scholars program awardees

University Service:

Departmental committees

Admissions and Awards committee 1998-2005; acting chair of Ph.D. recruitment for
Spring, 2004

Curriculum committee 1998-2000, 2003

Advisement committee 1999-2005

College/University committees/activities – various, including reviewer for Dean's
Undergraduate research fund, participation in Sunday at the Square series ("Genetics in
biology and modern medicine" presentation), and Freshman Dialogue

Peer review:

Manuscripts:

Developmental Biology, Genetics, Development, BMC Genomics, FEBS Letters,
Mechanisms of Development

On-line evaluations: Faculty of 1000 (since August, 2002)

Grants: NIH CMIR Study section (Oct, 2005), ad hoc: NSF, Genome Canada

Other: Textbook chapters (2) and educational website (1) reviews for W. H. Freeman