

Gary Ruvkun

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Major Research Interests

microRNA and RNA interference mechanisms, neuroendocrine control of metabolism and aging, microbial diversity.

Honors

1982	Society of Fellows, Harvard University
1998	Nippon Telephone and Telegraph Science Forum Public Lecture, Tokyo
2003	Harvey Lecturer, Rockefeller University
2005	Rosenstiel Award, Brandeis University, with Victor Ambros, Andy Fire, Craig Mello
2008	National Academy of Sciences
2008	Benjamin Franklin Medal, Franklin Institute, with Victor Ambros and David Baulcombe
2008	Albert Lasker Award for Basic Medical Research, with Victor Ambros and David Baulcombe
2008	Gairdner International Prize, with Victor Ambros
2008	Warren Triennial Prize, Massachusetts General Hospital, with Victor Ambros
2009	Louisa Gross Horwitz Prize, Columbia University, with Victor Ambros
2009	American Academy of Arts and Sciences
2009	Massry Prize, with Victor Ambros

Academic trajectory

1985 - present	Asst, Assoc., Professor of Genetics, Harvard Medical School
1982 - 1985	Junior Fellow, Society of Fellows, Harvard University Postdoctoral research with Bob Horvitz at MIT and Walter Gilbert at Harvard
1982	Ph.D. Harvard University (Biophysics), with Fred Ausubel
1973	A.B. University of California at Berkeley (Biophysics)

Bibliography

1. Ruvkun G., Ausubel F.M. 1980. Interspecies homology of nitrogenase genes. *Proc. Natl. Acad. Sci. USA* 77: 191-195.
2. Ruvkun G., Ausubel F.M. 1981. A general method for site-directed mutagenesis in prokaryotes. *Nature* 289: 85-88.
3. Ruvkun G., Long, S.R., Meade, H.M., Ausubel, F.M. 1981. Molecular genetics of symbiotic nitrogen fixation. *Cold Spring Harbor Symposium on Quantitative Biology* 45: 492-500.
4. Meade H.M., Long S.R., Ruvkun G., Brown S.E., Ausubel F.M. 1982. Physical and genetic characterization of symbiotic and auxotrophic mutants of *Rhizobium meliloti* induced by transposon Tn5 mutagenesis. *J Bacteriol* 149: 114-122.
5. Ruvkun G., Sundaresan V., Ausubel F.M. 1982. Specific protection of nucleotides in the *lac* operator from dimethyl sulfate (DMS) methylation of DNase I nicking by crude bacterial extracts. *Gene* 18: 245-255.
6. Ruvkun G., Sundaresan V., Ausubel F.M. 1982. Directed transposon Tn5 mutagenesis and complementation analysis of the *Rhizobium meliloti* symbiotic nitrogen fixation (*nif*) genes. *Cell* 29: 551-559.
7. Ruvkun, G., Long S.R., Meade H.M., van den Bos R.C., Ausubel F.M. 1982. ISRml: a *Rhizobium meliloti* insertion sequence which preferentially transposes into nitrogen fixation (*nif*) genes. *J Mol Appl Genet* 1: 405-418.

8. Meade, H.M., Long, S.R., Ruvkun, G., Brown, S.E., Ausubel, F.M. 1982. Physical and genetic characterization of symbiotic mutants of *Rhizobium meliloti* induced by transposon Tn5 mutagenesis. *J. Bacteriol* 149: 114-122.
9. Finney, M., Ruvkun, G., and Horvitz, H.R. 1988. The *Caenorhabditis elegans* cell lineage and differentiation gene *unc-86* encodes a protein containing a homeodomain and extended similarity to mammalian transcription factors. *Cell* 55: 757-769.
10. Herr, W., Sturm, R.A., Clerc, R.G., Corcoran, L.M., Baltimore, D., Sharp, P.A., Ingraham, H.A., Rosenfeld, M.G., Finney, M., Ruvkun, G., and Horvitz, H.R. 1988. The POU domain: a large conserved region in the mammalian *pit-1*, *oct-1*, *oct-2*, and *Caenorhabditis elegans unc-86* gene products. *Genes and Development* 2: 1513-1516.
11. Ruvkun, G., Ambros, V., Coulson, A., Waterston, R., Sulston, J., and Horvitz, H.R. 1989. Molecular genetics of the *Caenorhabditis elegans* heterochronic gene *lin-14*. *Genetics* 121: 501-516.
12. Ruvkun, G. and Giusto, J. 1989. The *Caenorhabditis elegans* heterochronic gene *lin-14* encodes a nuclear protein that forms a temporal switch during development. *Nature* 338: 313-319.
13. Bürglin, T.R., Finney, M., Coulson, A., and Ruvkun, G. 1989. *C. elegans* has scores of homeobox genes. *Nature* 341: 239-243.
14. Ruvkun, G., Gilbert, W., Horvitz, H.R. 1990. Detection of mutations and DNA polymorphisms using whole genome Southern Cross hybridization. *Nucleic Acids Research* 18: 809-815.
15. Finney, M. and Ruvkun, G. 1990. The *unc-86* gene product couples cell lineage and cell identity in *Caenorhabditis elegans*. *Cell* 63: 895-905.
16. Wightman, B., Bürglin, T.R., Gatto, J., Arasu, P., G. Ruvkun 1991. Negative regulatory sequences in the *lin-14* 3' untranslated region are necessary to generate a temporal switch during *C. elegans* development. *Genes and Development* 5: 1813-1824.
17. Arasu, P., Wightman, B., G. Ruvkun. 1991. Temporal regulation of *lin-14* by the antagonistic action of two other heterochronic genes, *lin-4* and *lin-28*. *Genes and Development* 5: 1825-1833.
18. Ruvkun, G., Wightman, B., Bürglin, T.R., and P. Arasu. 1991. Dominant gain of function mutations that lead to misregulation of the *C. elegans* heterochronic gene *lin-14*, and the evolutionary implications of dominant mutations in pattern-formation genes. *Development (Supplement)*: 47-54.
19. Ruvkun, G. and M. Finney 1991. Regulation of transcription and cell identity by POU domain proteins. *Cell* 64: 475-478.
20. Bürglin, T.R., Ruvkun, G., Coulson, A., Hawkins, N., McGhee, J., Schaller, D., Wittmann, C., Müller, F., and Waterston, R. 1991. A nematode homeobox cluster. *Nature* 351: 703.
21. Miller, D., Shen, M., Shamu, C., Bürglin, T., Ruvkun, G., Ghee, M. Dubois, L. Wilson 1992. The *C. elegans unc-4* gene encodes a homeodomain protein that determines the pattern of synaptic input to specific motor neurons. *Nature* 355: 841-845.
22. Xue, D.M., Finney, M., Ruvkun, G. and M. Chalfie. 1992. Regulation of the *mec-3* gene by the *C. elegans* homeoproteins *Unc-86* and *Mec-3*. *EMBO J.* 11: 4969-4979.
23. Ruvkun, G. 1992. A molecular growth industry *Nature* 360: 711-712.
24. Bürglin, T.R. and G. Ruvkun. 1992. New motif in PBX genes. *Nature Genet* 1: 319-320.
25. Ruvkun, G. Generation of temporal and cell lineage asymmetry during *C. elegans* development. In *Molecular Genetics of Development*, Springer Verlag, Berlin. 1992.
26. Wightman, B., I. Ha, and G. Ruvkun. 1993. Post-transcriptional regulation of the heterochronic gene *lin-14* by *lin-4* mediates temporal pattern formation in *C. elegans*. *Cell* 75: 855-862.
27. Bürglin, T. and G. Ruvkun 1993. The *Caenorhabditis elegans* homeobox cluster. *Current Opinion in Genetics and Development* 3: 615-620.
28. Gottlieb, S. and G. Ruvkun 1994. *daf-2*, *daf-16*, *daf-23*: Interacting genes that control dauer formation in *C. elegans*. *Genetics* 137: 107-120.
29. Greenstein, D., Hird, S. Plasterk, R., Andachi, Y., Kohara, Y., Wang, B., Finney, M., and G. Ruvkun 1994. Targeted mutations in the *C. elegans* POU-homeobox gene *ceh-18* cause defects in oocyte cell cycle arrest, gonad migration, and epidermal differentiation. *Genes and Development* 8: 1935-1948.

30. Baumeister, R., Liu, Y., and G. Ruvkun 1996. Lineage specific regulators couple cell lineage asymmetry to the transcription of the *Caenorhabditis elegans* POU gene *unc-86* during neurogenesis. *Genes and Development* 10: 1395-1410.
31. Morris, J.Z., Tissenbaum, H.A. and G. Ruvkun 1996. A phosphatidylinositol-3-OH kinase family member regulating longevity and diapause in *Caenorhabditis elegans*. *Nature* 382: 536-538.
32. Barnes, T.M., Jin, Y., Horvitz, H.R., Ruvkun, G., and S. Hekimi 1996. The *C. elegans* behavioral gene *unc-24* encodes a novel bipartite protein similar to both erythrocyte band 7.2 (stomatin) and non-specific lipid transfer protein (nsLTP). *J. of Neurochemistry* 67: 46-57.
33. Ha, I., Wightman, B. and G. Ruvkun 1996. A bulged *lin-4/lin-14* RNA duplex is sufficient for *Caenorhabditis elegans* *lin-14* temporal gradient formation. *Genes and Development* 10: 3041-3050.
34. Ruvkun, G. 1996. Patterning the *C. elegans* neuroectoderm. In *The Nematode Caenorhabditis elegans*, Cold Spring Harbor Press, Cold Spring Harbor, NY, p. 543-581.
35. Sze, J.Y., Liu, Y. and G. Ruvkun 1997. VP16-activation of the *C. elegans* neural specification transcription factor UNC-86 suppresses mutations in downstream genes and causes defects in neural migration and axon outgrowth. *Development* 124: 1159-1168.
36. Sluder, A. E., Lindblom, T. and G. Ruvkun 1997. An early patterning function for the *C. elegans* nuclear hormone receptor gene *nhr-2*. *Developmental Biology* 184: 303-319.
37. Hobert, O., Mori, I., Yamashita, Y., Honda, H., Ohshima, Y., Liu, Y. and G. Ruvkun 1997. Regulation of interneuron function in the *C. elegans* thermoregulatory pathway by the *ttx-3* LIM homeobox gene. *Neuron* 19: 345-357.
38. Patterson, G. I., Koweeck, A., Wong, A., Liu, Y., and G. Ruvkun 1997. The DAF-3 Smad protein antagonizes TGF-beta-related receptor signalling in the *C. elegans* dauer pathway. *Genes and Development* 11: 2679-2690.
39. Kimura, K.D., Tissenbaum, H.A., Liu, Y. and G. Ruvkun. 1997. *daf-2*, an insulin receptor-like gene that regulates longevity and diapause in *C. elegans*. *Science* 277: 942-946.
40. Ogg, S., Paradis, S., Gottlieb, S., Patterson, G.I., Lee, L., Tissenbaum, H.A., and G. Ruvkun 1997. The DAF-16 Fork head-related transcription factor transduces *C. elegans* insulin-like metabolic and longevity signals. *Nature* 389: 994-999.
41. Tissenbaum, H.A. and G. Ruvkun 1998. An insulin-like signaling pathway affects both longevity and reproduction in *C. elegans*. *Genetics* 148: 703-717.
42. Hobert, O., Liu, Y., D'Alberti, T., and G Ruvkun 1998. Control of neural development and function in a thermoregulatory circuit by the LIM homeobox gene *lin-11*. *J. Neuroscience* 18: 2084-2096.
43. Paradis, S. and G. Ruvkun 1998. *Caenorhabditis elegans* Akt/PKB transduces insulin receptor-like signals from AGE-1 PI3 kinase to the DAF-16 transcription factor. *Genes and Devel.* 12:2488-98.
44. Ruvkun, G. and O. Hobert. 1998. The taxonomy of developmental control in *Caenorhabditis elegans*. *Science* 282:2033-41.
45. Ogg, S. and G. Ruvkun 1998. The *C. elegans* PTEN homolog *daf-18* acts in the insulin receptor-like metabolic signaling pathway. *Mol Cell* 2: 887-93.
46. Slack, F. and G. Ruvkun 1998. Temporal pattern formation by heterochronic genes. *Annual Review of Genetics* 31: 611-634.
47. Guarente L., Ruvkun, G., R. Amasino. 1998. Aging, life span, and senescence. *Proc Natl Acad Sci U S A* 95:11034-6
48. Hobert O. and G. Ruvkun 1998. A common theme for LIM homeobox gene function across phylogeny? *Biol. Bull.* 195:377-80
49. Slack F. and G. Ruvkun 1998 Heterochronic genes in development and evolution. *Biol. Bull.* 195:375-6.
50. Slack F. and G. Ruvkun 1998. A novel repeat domain that is often associated with RING finger and B-box motifs. *Trends Biochem Sci* 23:474-5.
51. Hobert, O., Moerman DG, Clark KA, Beckerle MC, and G. Ruvkun 1999. A conserved LIM protein that affects muscular adherens junction integrity and mechanosensory function in *Caenorhabditis elegans*. *J Cell Biol* 144: 45-57.
52. Hobert O, Tessmar K and G. Ruvkun 1999. The *C. elegans* *lim-6* LIM homeobox gene regulates neurite outgrowth and function of particular GABAergic neurons. *Development* 126, 1547-1562

53. Paradis, S., Ailion, M., Toker A, Thomas, J.H., and G. Ruvkun. 1999. A PDK1 homolog is Necessary and Sufficient to Transduce AGE-1 PI3 Kinase Signals that Regulate Diapause in *C. elegans* Genes and Development 13: 1438-1452.
54. Sagasti, A, Hobert O, Troemel ER, Ruvkun G, Bargmann CI. 1999. Alternative olfactory neuron fates are specified by the LIM homeobox gene *lim-4*. Genes Dev 13: 1794-80.
55. Hobert O. and G. Ruvkun 1999. Pax genes in *C. elegans* : a new twist. Trends Genet 15: 214-216.
56. Davidson E.H. and G. Ruvkun 1999. Themes from a NASA workshop on gene regulatory processes in development and evolution. J Exp Zool 285: 104-15.
57. Tissenbaum, H.A. Hawdon, J., Perregeaux, M. , Hotez, P., Guarente, L., and G. Ruvkun. 2000. A common muscarinic pathway for diapause recovery in the distantly related nematode species *Caenorhabditis elegans* and *Ancylostoma caninum*. Proc. Natl. Acad. Sci. 97: 460-465.
58. Sze, J.Y., Victor, M., Loer, C., Shi, Y., and G. Ruvkun 2000. Food and metabolic signaling defects in a *C. elegans* serotonin null mutant, Nature 403: 560-4.
59. Reinhart, B.J., Slack, F.A., Basson, M., Pasquinelli, A.E., Bettinger, J.C., Rougvie, A.C., Horvitz, H.R., and G. Ruvkun. 2000. The 21 nucleotide *let-7* RNA regulates *C. elegans* developmental timing. Nature, 403: 901 - 906.
60. Slack, FJ, Basson, M., Liu, Z., Ambros, V., Horvitz, H.R., and G. Ruvkun. 2000. The *lin-41* RBCC gene acts in the *C. elegans* heterochronic pathway between the *let-7* regulatory RNA and the *lin-29* transcription factor. Mol. Cell 5: 659-69.
61. Kagoshima, H, Sommer, R., Reinhart, B. , Ruvkun, G., Cassata, G., and T. R. Bürglin. 2000. A graded hypodermal expression of *ceh-14* induced by a gonadal signal. Development Genes and Evolution 210:564-569.
62. Nasrin, N., Ogg, S., Cahill, C., Biggs, W., Nui, S., Dore, J., Calvo, D., Shi, Y., Ruvkun, G., and M. Alexander-Bridges. 2000. DAF-16 recruits the CBP co activator to the IGFBP-1 promoter in HepG2 cells. Proc. Natl. Acad. Sci., 97: 10412-7.
63. Pasquinelli, A., Reinhart, B., Slack F. , Maller, B., Kuroda, M., Martindale, M., Srinivasan, A., Fishman, M., Hayward. D., Ball. E., Degnan, B., Müller, P. , Spring, J., Finnerty, J., Corbo, J., Levine, M., Leahy, P. , Davidson, E., and G. Ruvkun. 2000. Conservation across animal phylogeny of the sequence and temporal expression of the 21 nucleotide *let-7* heterochronic regulatory RNA. Nature 408: 86-89.
64. Wolkow, C.A., Kimura, K.D., Lee, M. and G. Ruvkun. 2000. *C. elegans* lifespan is regulated by insulin-like signaling in the nervous system. Science 290:147-50.
65. Cahill, C.M., Tzivion, G., Nasrin, N., Ogg, S., Dore, J., Ruvkun, G., and M. Alexander-Bridges. 2001. PI-3 kinase signaling inhibits DAF-16 DNA binding and function via 14-3-3 dependent and independent pathways. J. Biol. Chem. 276: 13402-10.
66. Reinhart, B.J. and G. Ruvkun. 2001. Isoform-specific mutations in the *Caenorhabditis elegans* heterochronic gene *lin-14* affect stage-specific patterning. Genetics 157: 199-209.
67. Bürglin, T.R. and G. Ruvkun 2001. Regulation of ectodermal and excretory cell function by the *C. elegans* POU homeobox gene *ceh-6* Development 128: 779-790.
68. Pierce, S.B., Costa, M., Wisotzkey, R. , Devadhar, S., Homburger, S.A., Buchman, A.R., Ferguson, K.C., Heller, J., Platt, D.M. , Liu, L.X. , Pasquinelli, A.E., Doberstein, S.K. , G. Ruvkun. 2001. Regulation of DAF-2 receptor signaling by human insulin and *ins-1*, a member of the unusually large and diverse *C. elegans* insulin gene family. Genes and Development 15: 672-686.
69. Grishok, A., Pasquinelli, A.E., Conte, D., Li, N., Parrish, S., Ha, I., Baillie, D.L., Fire, A., Ruvkun, G., and Mello, C.C. 2001. Genes and mechanisms related to RNA interference regulate expression of the small temporal RNAs that control *Caenorhabditis elegans* developmental timing. Cell 106: 23-34.
70. Finch, C.E. and G. Ruvkun 2001. The Genetics of Aging. Ann. Rev. Genomics and Human Genetics 2: 435-462
71. Ruvkun, G. 2001. Glimpses of the tiny RNA world. Science 294:797-9.
72. Lee, R.Y.N., Hench, J., and G. Ruvkun 2001. Regulation of *C. elegans* DAF-16 and its human ortholog FKHL1 by the *daf-2* insulin-like signaling pathway. Curr Biol. 11: 1950-1957.

73. Sze, J.Y., Zhang, S., Li, J., and G. Ruvkun 2002 The *C. elegans* POU-domain transcription factor UNC-86 regulates the *tph-1* hydroxylase gene and neurite outgrowth in particular serotonergic neurons. *Development*, 129:3901-11
74. Pasquinelli, A.E. and G. Ruvkun 2002. Control of developmental timing by microRNAs and their targets. *Ann. Rev. Cell Biology.*, 18:495-513.
75. Ruvkun, G., M. Finney, G. Church, M. Zuber, W. Gilbert 2002. A Robotic-PCR Detector for DNA-based Life on Other Planets, in Signs of Life: A Report based on the April 2000 Workshop on Life Detection Techniques. Space Sciences Board, NASA.
76. Lee S.S, and Ruvkun G. 2002. Longevity: don't hold your breath. *Nature*. 418:287-8.
77. Wolkow CA, Munoz MJ, Riddle DL, G. Ruvkun. 2002. Insulin receptor substrate and p55 orthologous adaptor proteins function in the *Caenorhabditis elegans* *daf-2*/insulin-like signaling pathway. *J Biol Chem*. 277:49591-7.
78. Lee, S.S., Lee R.Y., Fraser, AG, Kamath, RS, Ahringer, J. and G Ruvkun 2002. A systematic RNAi screen identifies a critical role for mitochondria in *C. elegans* longevity. *Nature Genetics*, 33:40-8.
79. Ashrafi, K., Chang, F.Y., Watts, J.L, Fraser, AG, Kamath, RS, Ahringer, J. and G. Ruvkun 2003. Genome-wide RNAi analysis of *C. elegans* fat regulatory genes. *Nature*, 421:268-72.
80. Li, W. and G. Ruvkun 2003. *daf-28* encodes a *C. elegans* insulin like ligand that acts in the DAF-2 insulin like signaling pathway and is regulated by environmental cues. *Genes and Development*, 17: 844-58.
81. Bashirullah, A., Pasquinelli, A.E. Kiger, A., Perrimon, N, Ruvkun, G., and C. S. Thummel 2003. Coordinate regulation of small temporal RNAs at the onset of *Drosophila* metamorphosis. *Developmental Biology*, 259:1-8.
- 82 Pasquinelli, A.E., McCoy, A. Jimenez, E. , Salo, E., , Ruvkun, G. , Martindale, M. Q. and J. Bagnà 2003. Expression of the 22 nucleotide *let-7* heterochronic RNA throughout the Metazoa: A role in life history evolution? *Evolution and Development*, 5:372-378.
83. Aspöck, G, Ruvkun, G., and T. R. Bürglin. 2003. The *Caenorhabditis elegans* *ems* class homeobox gene *ceh-2* is required for M3 pharynx motoneuron function. *Development*, 130:3369-3378.
84. Lee, S.S., Kennedy,S., Tolonen,A.C. and G. Ruvkun. 2003. DAF-16 target genes that control *C. elegans* life-span and metabolism. *Science*. 300:644-7
85. Grad, Y., Aach, J., Hayes, G.D., Reinhart, B. , Church, G. M. , Ruvkun, G., and J. Kim. 2003. Computational and experimental identification of *C. elegans* microRNAs. *Molecular Cell*, 11:1253-63.
86. Garsin, D.A. J. M. Villanueva, J. Begun, D. H. Kim, C. D. Sifri, S. B. Calderwood, G. Ruvkun, and F. M. Ausubel. 2003. Long-Lived *Caenorhabditis elegans* *daf-2* Mutants are Resistant to Bacterial Pathogens, *Science*, 300:1921.
87. Ambros V, Bartel B, Bartel DP, Burge CB, Carrington JC, Chen X, Dreyfuss G, Eddy SR, Griffiths-Jones S, Marshall M, Matzke M, Ruvkun G, Tuschl T. 2003. A uniform system for microRNA annotation. *RNA*. 9: 277-279.
88. Ruvinsky, I. and G. Ruvkun 2003. Functional tests of enhancer conservation between distantly related species, *Development*, 130:5133-42.
89. Sze, J.Y. and G. Ruvkun. 2003. Olfactory hypersensitivity and hyperadaptation in *C. elegans* caused by activation of the UNC-86 POU transcription factor, *Proc. Natl. Acad. Sci.*, 100:9560-5.
90. Komaroff AL, Ruvkun G. 2003 . Unraveling the secrets of the cell. *Newsweek*. Dec 8; 142: 96.
91. Kim, J , Krichevsky, A., Grad, Y., Hayes, G.D., Kosik, K.S. , Church, G. M. , and G. Ruvkun. 2004. Identification of many mammalian neuron-expressed microRNAs that co-purify with polysomes, *Proc. Natl. Acad. Sci.*101: 360-5.
92. Ruvkun, G., B. Wightman, and I. Ha. 2004. The 20 years it took to recognize the importance of tiny RNAs. *Cell* S116: S93–S96,
93. Kennedy, S.K., D. Wang, and G. Ruvkun. 2004. A conserved siRNA degrading RNase negatively regulates RNA interference in *C. elegans* *Nature* 427: 645-9.
94. Tewari M, Hu PJ, Ahn JS, Ayivi-Guedehoussou N, Vidalain PO, Li S, Milstein S, Armstrong CM, Boxem M, Butler MD, Busiguina S, Rual JF, Ibarrola N, Chaklos ST, Bertin N, Vaglio P, Edgley ML, King KV, Albert PS, Vandenhoute J, Pandey A, Riddle DL, Ruvkun G, Vidal M. 2004. Systematic genetic

- perturbation analysis of a *Caenorhabditis elegans* TGF- β protein interaction network. *Molecular Cell* 13:469-82.
95. Mak, H. Y. and G. Ruvkun. 2004. Cell nonautonomous role of DAF-9 cytochrome P450 in *C. elegans* larval development and gonadal migration. *Development*, 131:1777-86.
 96. Mansfield JH, Harfe BD, Nissen R, Obenaus J, Srineel J, Chaudhuri A, Farzan-Kashani R, Zuker M, Pasquinelli AE, Ruvkun G, Sharp PA, Tabin CJ, McManus MT. 2004. MicroRNA-responsive 'sensor' transgenes uncover Hox-like and other developmentally regulated patterns of vertebrate microRNA expression. *Nat Genet.* 36:1079-83
 97. Ruvkun, G., J. Kim, G. Hayes, S. Kennedy, D. Wang, K. Ashrafi. 2004. The Tiny RNA World. *Harvey Lecture* 99: 1-21.
 98. Wang, D. and G. Ruvkun. 2004. The insulin pathway regulates RNAi in *C. elegans*. *Cold Spring Harbor Symposium on Quantitative Biology*, 69th edition, 69: 429-433.
 99. Kim, J.K., H. W. Gabel, R. S. Kamath, M. Tewari, A. Pasquinelli, S. Kennedy, M. Dybbs, N. Bertin, M. Vidal, J. M. Kaplan, and G. Ruvkun 2005. Functional genomic analysis of RNA interference in *C. elegans*. *Science* 308: 1164-7.
 100. Efimenko E, Bubb K, Mak HY, Holzman T, Leroux MR, Ruvkun G, Thomas JH, Swoboda P. 2005. Analysis of *xbx* genes in *C. elegans*. *Development*. 132:1923-34.
 101. Hamilton, B., Y. Dong, M. Shindo, W. Liu, G. Ruvkun, and S. S. Lee. 2005. A systematic RNAi screen for longevity genes in *C. elegans*. *Genes and Development* 19:1544-55.
 102. Sieburth, D, Q. Ch ng, M. Dybbs, M. Tavazoie, S. Kennedy, D. Wang, D. Dupuy, J. Rual, D. Hill, M. Vidal, G. Ruvkun, and J. Kaplan. 2005. Systematic analysis of genes required for synapse structure and function. *Nature* 436: 510-517.
 103. Wang, D. S. Kennedy, D. Conte, J. Kim, H. Gabel, R. Kamath, C. Mello, and G. Ruvkun. 2005. Somatic misexpression of germline P granules and enhanced RNA interference in *C.elegans* Retinoblastoma pathway mutants. *Nature* 436: 593-597.
 104. Frand, A.R., S. Russel, G. Ruvkun 2005. Genes essential for *C. elegans* molting revealed through a genome-wide RNA-interference screen. *PLoS*, 3:e312 [Epub ahead of print].
 105. Duchaine, T.F, J. A. Wohlschlegel, S. Kennedy, Y. Bei, D. Conte, K. Pang, D.R. Brownell, S. Harding, S. Mitani, G. Ruvkun, J. R. Yates, and C. C. Mello. 2006. Functional proteomics reveals the biochemical niche of *C. elegans* DCR-1 in multiple small-RNA-mediated pathways. *Cell* 124:343-54.
 106. Mak, H.Y., L.S. Nelson, M. Basson, C. D. Johnson and G. Ruvkun. 2006. Polygenic control of *C. elegans* fat storage. *Nature Genetics* 38:363-8.
 107. Sandoval, G.M., J. S. Duerr, J. Hodgkin, J. B. Rand & G. Ruvkun. 2006. A genetic interaction between the vesicular acetylcholine transporter VACHT/UNC-17 and synaptobrevin/SNB-1 in *C. elegans*. *Nature Neuroscience*, 9:599-601.
 108. Hu, P.J., J. Xu, and G. Ruvkun. 2006. Two membrane-associated tyrosine phosphatase homologs potentiate *C. elegans* AKT-1/PKB signaling. *PLoS Genet.* 2006 Jul;2(7):e99.
 109. Hayes, G. D. A. R. Frand, and G. Ruvkun. 2006. The *mir-84* and *let-7* paralogous microRNA genes of *Caenorhabditis elegans* direct the cessation of molting via the conserved nuclear hormone receptors NHR-23 and NHR-25. *Development* 133: 4631-4641.
 110. Ruvinsky, I., U. Ohler, C. B. Burge, and G. Ruvkun. 2006. Detection of broadly expressed neuronal genes in *C. elegans*. *Dev Biol.* 302: 617-26.
 111. Hayes, GD and G. Ruvkun. 2006. Misexpression of the *C. elegans* miRNA *let-7* is sufficient to drive developmental programs. *Cold Spring Harbor Symp Quant Biol.* 71: 21-7. *Regulatory RNAs.*
 112. Curran, S. P. and G. Ruvkun. Lifespan regulation by evolutionarily conserved genes essential for viability. 2007. *PLoS Genetics* 3(4):e56.
 113. Kim N, Dempsey C, Kuan CJ, Zoval J, O'Rourke E, Ruvkun G, Madou M, Sze J. 2007. Gravity force transduced by the MEC-4/MEC-10 DEG/ENaC channel modulates DAF-16/FoxO activity in *C. elegans*. *Genetics.* 177:835-45.
 114. Samuelson, A. V., Carr, C. E., and G. Ruvkun. 2007. Gene activities that mediate increased lifespan of *C. elegans* insulin-like signaling mutants. *Genes and Development* 21:2976-94.

115. Parry, D.H., Xu, J. and G. Ruvkun. 2007. A whole-genome RNAi screen for *C. elegans* miRNA pathway genes. *Current Biology* 17: 2013-22.
116. Isenbarger, T. A. , M. Finney, C. Ríos-Velázquez, J. Handelsman, and G. Ruvkun. 2007. Miniprimer PCR, a new lens for viewing the microbial world. *Appl Environ Microbiol.* 2008 Feb;74(3):840-9.
117. Pierce M.L., Weston M.D., Fritsch B., Gabel H.W., Ruvkun G., Soukup G.A. 2008. MicroRNA-183 family conservation and ciliated neurosensory organ expression. *Evol Dev.* 10(1):106-13.
118. Samuelson, A.V., R. R. Klimczak, D. Thompson, C. E. Carr, and G. Ruvkun. 2008. Identification of *C. elegans* genes regulating longevity using enhanced RNAi-sensitive strains. *Cold Spring Harb Symp Quant Biol.* 2007;72:489-97.
119. Gabel, H. W. and G. Ruvkun. 2008. The exonuclease ERI-1 plays a conserved dual role in RNA interference and ribosomal 5.8S RNA processing. *Nat Struct Mol Biol.* 15: 531-3.
120. Patel D.S., Fang L.L., Svy D.K., Ruvkun G., Li W. 2008. Genetic identification of HSD-1, a conserved steroidogenic enzyme that directs larval development in *Caenorhabditis elegans*. *Development.* 135: 2239-49.
121. Simon D.J., Madison J.M., Conery A.L., Thompson-Peer K.L., Soskis M., Ruvkun G., Kaplan J.M., Kim J.K. 2008. The microRNA miR-1 regulates a MEF-2-dependent retrograde signal at neuromuscular junctions. *Cell* 133: 903-15.
122. Ruvkun, G. 2008. Tiny RNA: Where do we come from? What are we? Where are we going? *Trends Plant Sci.* 13 :313-6.
123. Fischer, S.E.J., M. D. Butler, Q. Pan and G. Ruvkun. 2008. Trans-splicing in *C. elegans* generates the negative RNAi regulator ERI-6/7. *Nature* 455: 491-6.
124. Ruvkun G. 2008. The perfect storm of tiny RNAs. *Nat Med.* 14:1041-5.
125. Wang, M. C., E. O'Rourke and G. Ruvkun. 2008. Fat metabolism links germline stem cells and longevity in *C. elegans*. *Science* 322: 957-60.
126. Isenbarger, T.A, C. E. Carr, S. S. Johnson, M. Finney, G. M. Church, W. Gilbert, M. T. Zuber, and G. Ruvkun. 2008. The most conserved genome segments for life detection on Earth and other planets, *Origin of Life and Evolution of Biospheres*, 38(6):517-33. Oct 14. [Epub ahead of print].
127. Soukas, A. A., E. A. Kane, C. E. Carr, J. A. Melo, and G. Ruvkun. 2009. Rictor/TORC2 regulates fat metabolism, feeding, growth, and lifespan in *Caenorhabditis elegans*. *Genes and Development* 23: 496-511.
128. Butcher, R.A., J. R. Ragains, G. Ruvkun, J. Clardy, H. Y. Mak. 2009. Biosynthesis of the *C. elegans* dauer pheromone. *Proceedings of the National Academy of Sciences* 106(6):1875-9.
129. Ruvkun, G. 2009. Signaling pathways that regulate *C. elegans* lifespan, Ipsen Foundation Series. Paris.
130. Curran, S. P. X. Wu, C. Riedel, and G. Ruvkun. 2009. A soma-to-germline transformation in long-lived *C. elegans* mutants. *Nature* 459: 1079-84.

Papers reviewed and in revision:

131. Hayes, G. D. and G. Ruvkun *Caenorhabditis elegans somi-1* encodes a zinc-finger protein that mediates microRNA activity of the *let-7* paralogs *mir-84*. *Genes and Development*, in revision.

Research support

- 2 R01GM44619-18 NIH Control of *C. elegans* lineage by heterochronic genes. 30% effort. 05/01/1991 - 06/30/2012 Direct Costs \$364,442 Total costs \$644,152
- 5 R01 AG16636-11 NIH Genetic and molecular basis of longevity. 20% effort. 04/01/1999 – 08/31/2011 Direct Costs \$350,083 Total Costs \$619,064
- 4 R37 AG014161-14 NIH Inositol signaling in *C. elegans* senescence and diapause. 20% effort. 05/01/1996 - 08/31/2011 Direct Costs \$288,717 Total costs \$505,255
- 5 R01 DK070147-06 NIH Genetic Studies of Obesity-Related Traits in Model Organisms. 5% effort. 09/15/2004 - 08/31/2013 Direct Costs \$225,000 Total costs \$398,063

National Aeronautics and Space Administration NRA-01-01-ASTID-020 06/01/05-5/31/11 (administered through the Center for Space Research at MIT). Gary Ruvkun Harvard/MGH PI. Maria Zuber, MIT PI.

SETG, a Search for Extraterrestrial Genomes An in situ PCR Detector For Life on Mars Ancestrally Related to Life on Earth Total costs: \$281,424 year 1. \$245,414 year 2. \$246,399 year 3. MGH funding about 1/4. Center for Space Research engineering about 3/4. 4% effort.

National Aeronautics and Space Administration NNX09AO76G, 329732, REDGENES: Remotely Examining DNA with a Genetic Explorer in a Natural Extreme System. Gary Ruvkun Harvard/MGH PI. Maria Zuber, MIT PI. 6/30/09 to 6/30/11 Total costs: \$56,625 year 1, \$42,687 year 2

Patents

1. Issued 5/1/2001 US Patent # 6,225,120 Therapeutic and Diagnostic Tools for Impaired Glucose Tolerance Conditions.
2. Issued 10/8/2002 US Patent # 6,461,854 Methods of Screening Compounds Useful For Prevention of Infection or Pathogenicity.
3. Issued 8/19/2008 US Patent # 7,414,169 Therapeutic and Diagnostic Tools for Impaired Glucose Tolerance Conditions
4. Pending US Patent, AGE-1 polypeptides and related molecules and methods.
5. Pending US Patent, Polynucleotide and Polypeptide Fat Metabolism regulators and uses thereof
6. Pending US Patent, Polynucleotide and Polypeptide molting regulators and uses thereof
7. Pending US Patent, Compositions and methods that enhance RNA interference.
8. Pending US Patent, Compositions and methods that modulate RNA interference.

The Ruvkun lab

The lab currently has 17 postdoctoral fellows, 3 graduate students, and two staff researchers. Postdocs: Sylvia Fischer PhD from the Plasterk lab in Utrecht, Eyleen O'Rourke PhD from the Ielpi lab in Buenos Aires, Sean Curran PhD from the Koehler lab at UCLA, Justine Melo PhD from the Toczyski lab at UCSF, Xiaoyun Wu, PhD from the Hanes lab at Albany, Meng Wang PhD from the Bohmann lab at Rochester, Chi Zhang PhD from the Beachy lab at Johns Hopkins, Alex Soukas MD PhD from the Friedman lab at Rockefeller, Susana Garcia PhD from the Morimoto lab at Northwestern, Christian Riedel PhD from the Nasymth lab in Vienna, Buck Samuel PhD from the Gordon lab at Washington University, Carolyn Phillips PhD from the Dernburg lab at Berkeley, Taiowa Montgomery PhD from the Carrington lab at Oregon State, Yuval Tabach PhD from the Domany lab at the Weizmann Institute, and Gabe Hayes PhD from my lab finishing projects before moving onto a proper postdoc. Graduate students Zhen Shi, Sascha Russel, and Dave Shore are Harvard PhD students. Working jointly in the Ruvkun lab and Maria Zuber's lab at MIT on microbial detection instrumentation is Chris Carr PhD from the Department of Aeronautical Engineering at MIT and the MIT Department of Earth and Planetary Sciences, Clarissa Lui PhD from the Batt biomedical engineering lab at Cornell, and Sarah Stewart Johnson PhD a Junior Fellow in the Harvard Society of Fellows (on leave 2009-2010 as a White House Fellow). Working jointly with the Broad Institute is Annie Conery PhD, a project manager from the Meyer lab at UC Berkeley and Jonah Larkins-Ford, a technologist.

Former Ruvkun lab postdocs (in order of departure)

Andy Samuelson	Assistant Professor, University of Rochester
Devin Parry	Biology Teacher, The Lakeside School, Seattle
Alison Frand	Assistant Professor of Biochemistry, UCLA
Ho Yi Mak	Assistant Investigator, Stowers Institute
John Kim	Assistant Professor, Life Sciences Institute at Univ. of Michigan
Ilya Ruvinsky	Assistant Professor, Dept. Ecology and Evolution, University of Chicago
Patrick Hu	Assistant Professor, Life Sciences Institute at Univ. of Michigan
Weiying Li	Assistant Professor, Dept of Biological Structure, U Washington
Scott Kennedy	Assistant Professor, Dept of Pharmacology, U Wisconsin
Tom Isenbarger	University of Wisconsin School of Law
Sylvia Lee	Associate Professor, Dept of Molecular Biology and Genetics, Cornell University

Kaveh Ashrafi	Assistant Professor, Dept of Physiology, UCSF
Amy Pasquinelli	Associate Professor, Dept of Biology, UC San Diego
Cathy Wolkow	Assistant Professor, National Institute of Aging, Baltimore
Sarah Pierce	Senior Research Associate, King lab at University of Washington
Raymond Lee	Curator, Wormbase C. elegans database, Caltech
Frank Slack	Assoc. Professor, Biology Dept, Yale University
Oliver Hobert	Professor of Biochemistry and HHMI at Columbia University P&S
Ji Ying Sze	Assoc. Professor of Pharmacology, Albert Einstein School of Medicine
Ilho Ha	Professor of Biochemistry, Inje University, Korea
Scott Ogg	Director of Project Management, Arresto Biosciences, Palo Alto
Koutarou Kimura	Assistant Professor, National Institute of Genetics, Osaka, Japan
Garth Patterson	Assistant Dean at Rutgers University
Ralf Baumeister	Professor, University of Freiburg, Germany
Ann Sluder	Director of Biology, Scynexis, Research Triangle Park
Tom Barnes	Director of Research, GeneLogic Pharmaceuticals
Shoshanna Gottlieb	School teacher in Philadelphia.
David Greenstein	Assoc. Professor of Genetics, Univ of Minnesota
Prema Arasu	Assoc. Prof Veterinary Medicine, U North Carolina
Thomas Bürglin	Assoc. Professor Karolinska Institute, Stockholm
Michael Finney	Founder, MJ Research, now venture capital.

Former Ruvkun lab graduate students (in order of departure)

Harrison Gabel	Postdoctoral fellow, Greenberg lab, Harvard
Maurice Butler	Medical writer, BGB New York
Gabe Hayes	Postdoctoral work in the Ruvkun lab for another year
Duo Wang	Strategic Decisions Group, New York
Gisela Sandoval	Resident in Psychiatry at Univ of Chicago
Brenda Reinhart	postdoctoral research with Kathy Barton at Stanford
Suzanne Paradis	Assistant Professor, Brandeis University
Heidi Tissenbaum	Associate Professor, University of Massachusetts at Worcester
Jason Morris	Assistant Professor, Fordham University, NYC
Allison Kowweek	personal organizer
Bruce Wightman	Professor of Biology, Muhlenberg College

Other Ruvkun lab alumni

Tian Tian	Law student at Harvard Law School
Qi Pan	Research scientist at Zymogenetics
Julie Huang	Postdoc in Samara Reck-Peterson lab, Harvard

Recent Teaching

Spring 2003 Genetics 206 (with Perrimon, Vidal). Course director. 6 lectures and discussion.

Spring 2005 Genetics 206 (with Perrimon, Vidal). 6 lectures and discussion.

Spring 2007 Genetics 206 (with Perrimon, Vidal). 6 lectures and discussion.

Fall and Spring 2007, 2008 Life Sciences 190, Course director, with Schrag, Kolter, Pearson, Clardy, Ausubel, Church, Cavanaugh. Dozens of course meetings.

Professional Activities

1995 - present	Editor, Developmental Biology
2003 - present	Harvard Microbial Science Initiative Organizing Committee
2004 - present	Harvard Origins of Life Initiative
2003 - present	Associate Member, Broad Institute, MIT/Harvard
2004 - 2007	NIH National Advisory Council on Aging

2005 – 2008 Steering Committee for the Glenn Foundation Aging labs at HMS

Invited Presentations 2008 to 2010

2008 Yale Developmental Biology Symposium
2008 Keystone Symposium on Obesity
2008 Miami Winter Symposium on Regulatory RNA
2008 Keystone Symposium on miRNAs and siRNAs
2008 CCBR Mars meeting University of Toronto, Regulatory RNA
2008 Franklin Institute Benjamin Franklin Award Symposium
2008 UCSF Department of Biochemistry and Biophysics
2008 Jean Mitchell Watson Lecture, University of Chicago
2008 MIT Biology Department
2008 Janelia Farm Circadian Rhythms Symposium
2008 Merck Boston
2008 Rockefeller University Lecture
2008 Gairdner International Prize Canada Tour, three lectures in various provinces
2008 Warren Triennial Symposium, MGH
2008 Stanford University
2008 University of Michigan, Life Sciences Institute
2008 University of Massachusetts Worcester
2009 Princeton Molecular Biology
2009 SUNY Downstate Brooklyn
2009 Gordon Conference on Nucleic Acids
2009 Beyond the Central Dogma, Villars Switzerland
2009 Nobel Forum on comparative genomics

Scheduled

2009 Gairdner Symposium
2009 Massry Prize lecture at UCLA and USC
2009 Horwitz Prize seminar at Columbia University
2010 Keystone meeting on RNAi
2010 Kipnis Lecture at Washington University
2010 Sloan Kettering
2010 Cold Spring Harbor
2010 Genetics Society of America