CURRICULUM VITAE

MARIO RENATO CAPECCHI Professor

Date and Place of Birth:	October 6, 1937 - Verona, Italy
Citizenship:	U.S.
Phone:	(801) 581-7096
Fax:	(801) 585-3425
E-mail:	mario.capecchi@genetics.utah.edu

Degrees:

B.S. Antioch College, Yellow Springs, Ohio, 1961, Chemistry and Physics
Ph.D. Harvard University, Cambridge, Massachusetts, 1967, Biophysics

Positions Held:

1969-1971	Assistant Professor, Harvard Medical School
1971-1973	Associate Professor, Harvard Medical School
1973-present	Professor of Biology, University of Utah
1982-present	Adjunct Professor of Oncological Sciences, Division of Molecular Biology and Genetics, University of Utah School of Medicine
1988-present	Investigator of the Howard Hughes Medical Institute
1989-present	Professor of Human Genetics, University of Utah School of Medicine
2002-present	Co-Chairman of the Department of Human Genetics, University of Utah School of Medicine

Honors and Awards:

Junior Fellow of the Society of Fellows, Harvard University, 1967-69
American Chemical Society Award in Biochemistry, 1969
Established Investigator of the American Heart Association, 1969-72
America's Ten Outstanding Young Men Award, 1971
National Institutes of Health Career Development Award, 1972-74
American Cancer Society Faculty Research Award, 1974-79
Taught Cold Spring Harbor Summer Course on Microinjection and DNA Transfection, 1984, 1985
Chairman of the Gordon Conference on Molecular Genetics, 1986
Distinguished Research Award, University of Utah, 1987
Chairman of Banbury Conference on Developmental Genetics, Cold Spring Harbor, 1989
Member of the National Academy of Sciences, 1991-present
Recipient of NIH MERIT grant award, 1992 to 2001
Recipient of the Fifth Annual Bristol-Myers Squibb Award for Distinguished Achievement in Neuroscience Research, 1992
Recipient of the 1993 Gairdner Foundation International Award for Achievements in Medical Science
Distinguished Professor of Human Genetics and Biology, University of Utah, 1993-present
Recipient of the 1994 General Motors Corporation's Alfred P. Sloan Jr. Prize for Outstanding Basic Science Contributions to Cancer Research
Recipient of the 1996 Molecular Bioanalytics Prize, Germany

Laureate of the 1996 Kyoto Prize in Basic Sciences
Recipient of the 1997 Franklin Medal for Advancing Our Knowledge of the Physical Sciences
Feodor Lynen Lectureship, 1998 Miami Biosymposium
Recipient of the 1998 Rosenblatt Prize for Excellence
Recipient of the 1998 Baxter Award for Distinguished Research in the Biomedical Sciences, Association of American Medical Colleges
Helen Lowe Bamberger Colby and John E. Bamberger Presidential Endowed Chair in the Health Sciences Center, University of Utah, 1999
Phi Kappa Phi National Honor Society, 1999
Lecturer in the Life Sciences for the Collège de France, 1999-2000
Recipient of the 2000 Horace Mann Distinguished Alumni Award, Antioch College
Recipient of the 2000 Premio Phoenix-Anni Verdi for Genetic Research Award, Italy
Recipient of the 33rd Jiménez-Diáz Prize for Contributions to Medical Genetics, Spain, 2001
Recipient of the 2001 Pioneers of Progress Award
Recipient of the 2001 Albert Lasker Award for Basic Medical Research
Elected to the rank of Fellow of the American Association for the Advancement of Science, 2001
Recipient of the State of Utah Governor's Science and Technology Award, 2002
Laureate of the 2001 National Medal of Science
Recipient of NIH MERIT grant award, 2002 to 2011
Recipient of the 2002 John Scott Medal Award
Recipient of the 2002 Shaul and Meira Massry Foundation Prize
Elected to the European Academy of Sciences, 2002
Recipient of the 2003 Pezcoller Foundation-AACR International Award for Cancer Research
Recipient of the 2002/03 Wolf Prize in Medicine
Recipient of an Honorary Degree of Doctor of Medicine, University of Florence School of Medicine, Italy, 2004
Recipient of the 2005 March of Dimes Prize in Developmental Biology

Teaching Responsibilities:

Biochemistry
Cell Biology
Developmental Genetics
Eukaryotic Genetics
Genetics
Molecular Biology

Memberships/Services:

Member of the American Biochemical Society, 1969-present
Member of the American Society for Biochemistry and Molecular Biology, 1969-present
Member of the National Science Foundation Advisory Panel on Genetics, 1975-1980
Member of the National Institute of Health Advisory Panel on Mammalian Genetics, 1981-85
Member of the Utah Regional Cancer Center, 1985-present
Member of the American Association for the Advancement of Science, 1987-present
Member of the Science Innovation Program Committee, 1991-present
Member of the American Society for Microbiology, 1994-present
Charter Fellow of the Molecular Medicine Society, 1994-present
Member of the New York Academy of Sciences, 1995-2003
Member of the Advisory Panel for the European Molecular Biology Laboratory, Heidelberg, Germany, 1995-present

Member of the Genetical Society, 1997-2000
Member of the Society for Developmental Biology, 1997-present
Member of the International Mammalian Genome Society, 1997-2003
Member of the Board of Scientific Counselors, NCI, 1997-2001
Fellow of the American Academy of Microbiology, 1997-present
Member of the Genetics Society of America, 1998-present
Honorary and Lifetime Member of the American Society of Hematology, 2000-present
Member of the American Society for Clinical Investigation, 2001-present
Member of the Editorial Boards of:
Somatic Cell and Molecular Biology, 1982-present
DNA, 1982-present
Molecular and Cellular Biology, 1985-present
Bio Essays, 1985-present
Technique, 1989-present
Mechanisms of Development, 1990-present
Neurobiology of Disease, 1994-2000
Molecular Medicine, 1994-present
Cell Structure and Function, 1994-present
Developmental Biology, 1995-2001
FASEB Journal, 1996-1999
The inScight Editorial Board (Academic Press), 1998-present
Proceedings of the National Academy of Sciences, 1998-2000
Rejuvenation Research, 2004

Reviewer for Cell, Current Biology, Development, Developmental Biology, Developmental Dynamics, EMBO Journal, FASEB Journal, Genes and Development, Journal of Biological Chemistry, Molecular and Cellular Biology, Nature, Nature Genetics, Proceedings of the National Academy of Sciences, Science, Trends in Genetics, Trends in Neurosciences

Publications:

Capecchi, M. R. and G. N. Gussin (1965). Suppression *in vitro*: Identification of a serine-tRNA as a "Nonsense Suppressor." *Science* **149**:417-422.

Adams, J. M. and M. R. Capecchi (1966). N-formylmethionine-tRNA as the initiator of protein syntheses. *Proc. Natl. Acad. Sci. USA* **55**:147-155.

Capecchi, M. R. (1966). Initiation of *E. coli* proteins. *Proc. Natl. Acad. Sci. USA* **55**:1517-1524.

Capecchi, M. R. (1966). Cell-free protein synthesis programmed with R17 RNA: Identification of two phage proteins. *J. Mol. Biol*. **21**:173-193.

Bergquist, P. L. and M. R. Capecchi (1966). Fractionation of a suppressor tRNA. *J. Mol. Biol.* **19**:202-206.

Gussin, G. N., M. R. Capecchi, J. M. Adams, J. E. Argetsinger, J. Tooze, K. Weber and J. D. Watson (1966). Protein synthesis directed by RNA phage messengers. *Cold Spring Harbor Symp. Quant. Biol.* **31:**257-271.

Publications: (cont'd)

Capecchi, M. R. (1967). Polycistronic messenger RNA and the phenomenon of suppression, BBA Library. In *Regulation of Nucleic Acid and Protein Synthesis* (V. V. Konigsberger and L. Bosch, Ed.), Vol. 10, pp. 243-258. Amsterdam: Elsevier Publishing Co.

Capecchi, M. R. (1967). A rapid assay for polypeptide chain termination. *Biophys. Res. Comm*. **28**:773-778.

Capecchi, M. R. (1967). Polypeptide chain termination *in vitro*: Isolation of a release factor. *Proc. Natl. Acad. Sci. USA* **58**:1144-1151.

Capecchi, M. R. (1967). Polarity *in vitro*. *J. Mol. Biol*. **30**:213-217.

Capecchi, M. R. and H. A. Klein (1969). Characterization of three proteins involved in polypeptide chain termination. *Cold Spring Harbor Symp. Quant. Biol*. **28**:469-477.

Capecchi, M. R. and H. A. Klein (1970). Release factors mediating termination of complete proteins. *Nature* **26**:1029-1033.

Klein, H. A. and M. R. Capecchi (1971). Polypeptide chain termination, purification of the release factors, R_1 and R_2 from *Escherichia coli*. *J. Biol. Chem*. **246**:1055-1061.

Sharp, J. D., N. E. Capecchi and M. R. Capecchi (1973). Altered enzymes in drug resistant variants of mammalian tissue culture cells. *Proc. Natl. Acad. Sci. USA* **70**:4732-4736.

Capecchi, M. R., N. E. Capecchi, S. H. Hughes and G. M. Wahl (1974). Selective degradation of abnormal proteins in mammalian tissue culture cells. *Proc. Natl. Acad. Sci. USA* **71**:4732-4736.

Hughes, S. H., G. M. Wahl and M. R. Capecchi (1975). Purification and characterization of mouse hypoxanthine-guanine phosphoribosyl transferase. *J. Biol. Chem*. **250**:120-126.

Wahl, G. M., S. H. Hughes and M. R. Capecchi (1975). Immunological characterization of hypoxanthine-guanine phosphoribosyl transferase mutants of mouse L cells: Evidence for mutations at different loci n the HGPRT gene. *J. Cell Phys*. **85**:307-320.

Capecchi, M. R., S. H. Hughes and G. M. Wahl (1975). Yeast super suppressors are altered tRNAs capable of translating a nonsense codon *in vitro*. *Cell* **6**:269-277.

Capecchi, M. R. and R. E. Webster (1975). Bacteriophage RNA as template for *in vitro* protein synthesis. In *RNA Phages* (N. D. Zinder, Ed.). Pp. 279-299. Cold Spring Harbor, New York: Cold Spring Harbor Press.

Publications: (cont'd)

Capecchi, M. R., R. A. V. Haar, N. E. Capecchi and M. M. Sveda (1977). The isolation of a suppressible nonsense mutant in mammalian cells. *Cell* **12**:371-381.

Capecchi, M. R., R. A. V. Haar, N. E. Capecchi and M. M. Sveda (1977). Molecular approaches to eucaryotic genetic systems. *ICN-UCLA Symposia* **8**:381-398.

Capecchi, M. R., R. A. V. Haar and M. M. Sveda (1978). Characterization of nonsense mutants in mammalian cells in culture. In *Mutations and tRNA Nonsense Suppressors* (J. E. Celis and J. D. Smith, Eds.). New York: Academic Press.

Capecchi, M. R. (1980). High efficiency transformation by direct microinjection of DNA into cultured mammalian cells. *Cell* **22**:479-488.

Folger, K. R., E. A. Wong, G. Wahl and M. R. Capecchi (1982). Patterns of integration of DNA microinjected into cultured mammalian cells: Evidence for homologous recombination between injected plasmid DNA molecules. *Mol. Cell. Biol*. **2**:1372-1387.

Hudziak, R. M., F. A. Laski, U. L. R. Bhandary, P. A. Sharp and M. R. Capecchi (1982). Establishment of mammalian cell lines containing multiple nonsense mutations and functional suppressor tRNA genes. *Cell* **31**:137-146.

Luciw, P. A., J. M. Bishop, H. E. Varmus and M. R. Capecchi (1983). Location and function of retroviral and SV40 sequences that enhance biochemical transformation after microinjection of DNA. *Cell* **33**:705-716.

Young, J. F., M. R. Capecchi, F. A. Laski, U. L. R. Bhandary, P. A. Sharp and P. Palese (1983). Measurement of suppressor transfer RNA activity. *Science* **221**:873-875.

Folger, K. R., K. R. Thomas and M. R. Capecchi (1984). Analysis of homologous recombination in cultured mammalian cells. *Cold Spring Harbor Symp. Quant. Biol.* **49**:123-138.

Laski, F. A., R. Belagaje, R. M. Hudziak, M. R. Capecchi, G. P. Norton, P. Palese, U. L. R. Bhandary and P. A. Sharp (1984). Synthesis of an ochre suppressor tRNA gene and expression in mammalian cells. *EMBO J*. **3**:2445-2452.

Folger, K. R., K. R. Thomas and M. R. Capecchi (1985). Nonreciprocal exchanges of information between DNA duplexes coinjected into mammalian cell nuclei. *Mol. Cell. Biol*. **5**:59-69.

Folger, K. R., K. R. Thomas and M. R. Capecchi (1985). Efficient correction of mismatched bases in plasmid heteroduplexes injected into cultured mammalian cell nuclei. *Mol. Cell. Biol*. **5**:70-74.

Frels, W. I., J. A. Bluestone, R. J. Hodes, M. R. Capecchi and D. S. Singer (1985). Expression of a microinjected porcine class I major histocompatibility complex gene in transgenic mice. *Science* **228**:577-580.

Publications: (cont'd)

Wong, E. A. and M. R. Capecchi (1985). Effects of cell cycle position on transformation by microinjection. *Somat. Cell Mol. Genet*. **11**:45-51.

Goddard, J. M., J. J. Weiland and M. R. Capecchi (1986). Isolation and characterization of *Caenorhabditis elegans* DNA sequences homologous to the V-*abl* oncogene. *Proc. Natl. Acad. Sci. USA* **83**:2172-2176.

Thomas, K. R., K. R. Folger and M. R. Capecchi (1986). High frequency targeting of genes to specific sites in the mammalian genome. *Cell* **44**:419-428.

Wong, E. A. and M. R. Capecchi (1986). Analysis of homologous recombination in cultured mammalian cells in a transient expression and a stable transformation assay. *Somat. Cell Mol. Genet*. **12**:63-72.

Thomas, K. R., and M. R. Capecchi (1986). Introduction of homologous DNA sequences into mammalian cells induces mutations in the cognate gene. *Nature* **324**:34-38.

Thomas, K. R. and M. R. Capecchi (1986). Targeting of genes to specific sites in the mammalian genome. *Cold Spring Harbor Symp. Quant. Biol*. **51**:1101-1113.

Wong, E. A. and M. R. Capecchi (1987). Homologous recombination between coinjected DNA sequences peaks in early to mid-S phase. *Mol. Cell. Biol*. **7**:2294-2295.

Thomas, K. R. and M. R. Capecchi (1987). Site-directed mutagenesis by gene targeting in mouse embryo-derived stem cells. *Cell* **51**:503-512.

Mansour, S. L., K. R. Thomas and M. R. Capecchi (1988). Disruption of the proto-oncogene *int-2* in mouse embryo-derived stem cells: A general strategy for targeting mutations to nonselectable genes. *Nature* **336**:348-352.

Capecchi, M. R. (1989). Altering the genome by homologous recombination. *Science* **244**:1288-1292.

Capecchi, M. R., K. R. Thomas and S. L. Mansour (1989). Creating mice with specific mutations by gene targeting. In *Molecular Genetics of Early Drosophila and Mouse Development* (M. R. Capecchi, Ed.). Pp. 45-52. Cold Spring Harbor, New York: Cold Spring Harbor Press.

Capecchi, M. R. (1989). The new mouse genetics: altering the genome by gene targeting. *Trends Genet*. **5**:70-76.

Mansour, S. L., K. R. Thomas, C. Deng and M. R. Capecchi (1990). Introduction of a *lacZ* reporter gene into the mouse *int-2* locus by homologous recombination. *Proc. Natl. Acad. Sci. USA* **87**:7688-7692.

Thomas, K. R. and M. R. Capecchi (1990). Targeted disruption of the murine *int-1* proto-oncogene resulting in severe abnormalities in midbrain and cerebellar development. *Nature* **346**:847-850.

Capecchi, M. R. (1990). Tapping the cellular telephone. *Nature* **344**:105.

Publications: (cont'd)

Capecchi, M. R. (1990). How efficient can you get? *Nature* **348**:109.

Chisaka, O. and M. R. Capecchi (1991). Regionally restricted developmental defects resulting from targeted disruption of the mouse homeobox gene *hox-1.5*. *Nature* **350**:473-479.

Thomas, K. R., T. A. Musci, P. E. Neumann and M. R. Capecchi (1991). *Swaying* is a mutant allele of the proto-oncogene *Wnt-1*. *Cell* **67**:969-976.

Chisaka, O., T. S. Musci and M. R. Capecchi (1992). Developmental defects of the ear, cranial nerves and hindbrain resulting from targeted disruption of the mouse homeobox gene *hox-1.6*. *Nature* **355**:516-520.

Thomas, K. R., C. Deng and M. R. Capecchi (1992). High-fidelity gene targeting in embryonic stem cells by using sequence replacement vectors. *Mol. Cell. Biol*. **12**:2919-2923.

Deng, C. and M. R. Capecchi (1992). Reexamination of gene targeting frequency as a function of the extent of homology between the targeting vector and the target locus. *Mol. Cell. Biol*. **12**:3365-3371.

Mansour, S. L., J. M. Goddard and M. R. Capecchi (1993). Mice homozygous for a targeted disruption of the proto-oncogene *int-2* have developmental defects in the tail and inner ear. *Development* **117**:13-28.

Deng, C., K. R. Thomas and M. R. Capecchi (1993). Location of crossovers during gene targeting with insertion and replacement vectors. *Mol. Cell. Biol*. **13**:2134-2140.

Capecchi, M. R. (1993). YACs to the rescue. *Nature* **362**:205-206.

Carpenter, E. M., J. M. Goddard, O. Chisaka, N. R. Manley and M. R. Capecchi (1993). Loss of *Hoxa-1* (*Hox-1.6*) function results in the reorganization of the murine hindbrain. *Development* **118**:1063-1075.

Condie, B. G. and M. R. Capecchi (1993). Mice homozygous for a targeted disruption of *Hoxd-3* (*Hox-4.1*) exhibit anterior transformations of the first and second cervical vertebrae, the atlas and the axis. *Development* **119**:579-595.

Capecchi, M. R. (1994). Targeted gene replacement. *Sci. Am*. **270**:54-61.

Kostic, D. and M. R. Capecchi (1994). Targeted disruptions of the murine *hoxa-4* and *hoxa-6* genes result in homeotic transformations of components of the vertebral column. *Mech. Dev*. **46**:231-247.

Davis, A. P. and M. R. Capecchi (1994). Axial homeosis and appendicular skeleton defects in mice with targeted disruption of *hoxd-11*. *Development* **120**:2187-2198.

Publications: (cont'd)

Condie, B. G. and M. R. Capecchi (1994). Mice with targeted disruptions in the paralogous genes *hoxa-3* and *hoxd-3* reveal synergistic interactions. *Nature* **370**:304-307.

Spyropoulos, D. D. and M. R. Capecchi (1994). Targeted disruption of the *even-skipped* gene, *evx1*, causes early postimplantation lethality of the mouse conceptus. *Genes Dev*. **8**:1949-1961.

Rancourt, D. E., T. Tsuzuki and M. R. Capecchi (1995). Genetic interaction betweeen *hoxb-5* and *hoxb-6* is revealed by nonallelic noncomplementation. *Genes Dev*. **9**:108-122.

Capecchi, M. R. (1995). A personal view of gene targeting. In *Accomplishments in Cancer Research 1994*. (J. G. Fortner and J. E. Rhoads, Ed.) Philadelphia: J. B. Lippincott, pp. 67-78.

Manley, N.R. and M.R. Capecchi (1995). The role of *hoxa-3* in mouse thymus and thyroid development. *Development* **121**:1989-2003.

Davis, A.P., D.P. Witte, H.M. Hsieh-Li, S.S. Potter and M.R. Capecchi (1995). Absence of radius and ulna in mice lacking *hoxa-11* and *hoxd-11*. *Nature* **375**:791-796.

Capecchi, M.R. (1995). The molecular genetic analysis of mouse development. In *Seminars in Developmental Biology*. (M.R. Capecchi, Ed.) London: Academic Press **6**:233-237.

Zeiher, B.G., E. Eichwald, J. Zabner, J.J. Smith, A.P. Puga, P.B. McCray, Jr., M.R. Capecchi, M.J. Welsh, and K.R. Thomas (1995). A mouse model for the Δ-F508 allele of cystic fibrosis. *J. Clin. Invest*. **96**:2051-2064.

Davis, A.P. and M.R. Capecchi (1996). A mutational analysis of the 5' Hox D genes: Dissection of genetic interactions during limb development in the mouse. *Development* **122**:1175-1185.

Delort, J.P. and M.R. Capecchi (1996). TAXI/UAS: a molecular switch to control expression of genes *in vivo*. *Hum. Gene Ther*. **7**:809-820.

Boulet, A.M. and M.R. Capecchi (1996). Targeted disruption of *hoxc-4* causes esophageal defects and vertebral transformations. *Dev. Biol*. **177**:232-249

Esther, C. R., Jr., T. E. Howard, E. M. Marino, J. M. Goddard, M. R. Capecchi and K. E. Bernstein (1996). Mice lacking angiotensin-converting enzyme have low blood pressure, renal pathology, and reduced male fertility. *Lab. Invest*. **74**:953-965.

Goddard, J. M., M. Rossel, N. R. Manley and M. R. Capecchi (1996). Mice with targeted disruption of *Hoxb-1* fail to form the motor nucleus of the VIIth nerve. *Development* **122**:3217-3228.

Barrow, J. R. and M. R. Capecchi (1996). Targeted disruption of the *hoxb-2* locus in mice interferes with expression of *hoxb-1* and *hoxb-4*. *Development* **122**:3817-3828.

Publications: (cont'd)

Esther, C. R., Jr., T. E. Howard, Y. Zhou, M. R. Capecchi, M. B. Marrero and K. E. Bernstein (1996). Lessons from angiotensin-converting enzyme-deficient mice. *Curr. Opin. Nephrol. Hypertens*. **5**:463-467.

Capecchi, M. R. (1996). Function of homeobox genes in skeletal development. In *Molecular and Developmental Biology of Cartilage*, Vol. 785. (B. de Crombrugghe, W. A. Horton, B. R. Olsen, and F. Ramirez, Eds.) *Ann. N. Y. Acad. Sci*. **785**:34-37.

Chen, F. and M. R. Capecchi (1997). Targeted mutations in *Hoxa-9* and *Hoxb-9* reveal synergistic interactions. *Dev. Biol*. **181**:186-196.

Humphries, M. M., D. Rancourt, G. J. Farrar, P. Kenna, M. Hazel, R. A. Bush, P. A. Sieving, D. M. Sheils, N. McNally, P. Creighton, A. Erven, A. Boros, K. Gulya, M. R. Capecchi and P. Humphries (1997). Retinopathy induced in mice by targeted disruption of the rhodopsin gene. *Nature Genet.* **15**:216-219.

Thomas, K. R. and M. R. Capecchi (1997). Recombinant DNA technique and sickle cell anemia research. *Science.* **275:**1404-1405.

Capecchi, M. R. (1997). The role of *Hox* genes in hindbrain development. In *Molecular and Cellular Approaches to Neural Development*. (W.M. Cowan, T.M. Jessell and S.L. Zipursky, Eds.) New York: Oxford University Press, pp. 334-355.

Esther, C. R., Jr., E. M. Marino, T. E. Howard, A. Machaud, P. Corvol, M. R. Capecchi and K. E. Bernstein (1997). The critical role of tissue angiotensin-converting enzyme as revealed by gene targeting in mice. *J. Clin. Invest*. **99**:2375-2385.

Carpenter, E. M., J. M. Goddard, A. P. Davis, T. P. Nguyen and M. R. Capecchi (1997). Targeted disruption of *Hoxd10* affects mouse hindlimb development. *Development* **124**:4505-4514.

Capecchi, M. R. (1997). *Hox* genes and mammalian development. In *Cold Spring Harbor Symposia on Quantitative Biology: Pattern Formation during Development*. Vol. LXII. Cold Spring Harbor, NY: Cold Spring Harbor Laboratory Press, pp. 273-281.

Condie, B. C., G. Bain, D. I. Gottlieb and M. R. Capecchi (1997). Cleft palate in mice with a targeted mutation in the γ-aminobutyric acid-producing enzyme glutamic acid decarboxylase 67. *Proc. Natl. Acad. Sci. USA* **94**:11451-11455.

Manley, N. R. and M. R. Capecchi (1997). Hox group 3 paralogous genes act synergistically in the formation of somitic and neural crest-derived structures. *Dev. Biol.* **192**:274-288.

Wilder, P. J., D. Kelly, K. Brigman, C. L. Peterson, T. Nowling, Q.-S. Gao, R. D. McComb, M. R. Capecchi and A. Rizzino (1997). Inactivation of the FGF-4 gene in embryonic stem cells alters the growth and/or the survival of their early differentiated progeny. *Dev. Biol.* **192**:614-629.

Publications: (cont'd)

Capecchi, M. R. (1997). The Making of a Scientist. In *Kyoto Prizes and Inamori Grants 1996.* Kyoto: The Inamori Foundation.

Hostikka, S. L. and M. R. Capecchi (1998). The mouse *Hoxc11* gene: genomic structure and expression pattern. *Mech. Dev*. **70**:133-145.

Godwin, A. R. and M. R. Capecchi (1998). *Hoxc13* mutant mice lack external hair. *Genes Dev*. **12**:11-20.

Manley, N. R. and M. R. Capecchi (1998). *Hox* group 3 paralogs regulate the development and migration of the thymus, thyroid and parathyroid glands. *Dev. Biol.* **195:**1-15.

Capecchi, M. R. (1998). Gene targeting: an historical perspective. In *Novel Systems for the Study of Human Diseases--From Basic Research to Applications.* Pp. 49-54. OECD Proceedings.

Chen, F., J. Greer and M. R. Capecchi (1998). Analysis of *Hoxa7/Hoxb7* mutants suggests periodicity in the generation of the different sets of vertebrae. *Mech. Dev.* **77:**49-57.

Godwin, A. R., H. S. Stadler, K. Nakamura and M. R. Capecchi. (1998). Detection of targeted *GFP-Hox* gene fusions during mouse embryogenesis. *Proc. Natl. Acad. Sci. USA* **95:**13042-13047.

Chen, F. and M. R. Capecchi. (1999). The paralogous mouse *Hox* genes, *Hoxa9, Hoxb9* and *Hoxd9,* function together to control development of the mammary gland in response to pregnancy. *Proc. Natl. Acad. Sci. USA* **96:**541-546.

Schmidt, E. E., E. S. Hanson and M. R. Capecchi (1999). Sequence-independent assembly of spermatid mRNAs into mRNP particles. *Mol. Cell. Biol.* **19**:3904-3915.

Bunting, M., K. E. Bernstein, J. M. Greer, M. R. Capecchi and K. R. Thomas (1999). Targeting genes for self-excision in the germline. *Genes Dev.* **13:**1524-1528.

Barrow, J. R. and M. R. Capecchi (1999). Compensatory defects associated with mutations in *Hoxa1* restore normal palatogenesis to *Hoxa2* mutants. *Development* **126**:5011-5026.

Rossel, M. and M. R. Capecchi (1999). Mice mutant for both *Hoxa1* and *Hoxb1* show extensive remodeling of the hindbrain and defects in craniofacial development. *Development* **126**:5027-5040.

Godwin, A. R. and M. R. Capecchi (1999). Hair defects in *Hoxc13* mutant mice. *J. Invest. Dermatol. Symp. Proc.* **4:**244-247.

Hashimoto, J., G. Murakami, M. H. Tsugane, O. Chisaka, M. R. Capecchi and T. Ogino (1999). Lumbosacral plexus in *Hoxa9* knockout mice with special reference to

Publications: (cont'd)

their nerve variations identified according to whether they were interphenotypic or intergenotypic differences. *Kaibogaku Zasshi* **74:**609-630.

Capecchi, M. R. (2000). Human germline gene therapy: How and why. In *Engineering the Human Germline.* (G. Stock and J. Campbell, Eds.) New York: Oxford University Press, pp. 31-42.

Greer, J. M., J. Puetz, K. R. Thomas and M. R. Capecchi (2000). Maintenance of functional equivalence during paralogous *Hox* gene evolution. *Nature* **403**:661-665.

Barrow, J. R., H. S. Stadler and M. R. Capecchi (2000). Roles of *Hoxa1* and *Hoxa2* in patterning the early hindbrain of the mouse. *Development* **127**:933-944.

Moon, A. M., A. M. Boulet and M. R. Capecchi (2000). Normal limb development in conditional mutants of *Fgf4*. *Development* **127**:989-996.

Capecchi, M. R. (2000). How close are we to implementing gene targeting in animals other than the mouse? *Proc. Natl. Acad. Sci. USA* **97**:956-957.

Capecchi, M. R. (2000). Choose your target. *Nature Genet.* **26**:159-161.

Schmidt, E. E., D. S. Taylor, J. R. Prigge, S. Barnett and M. R. Capecchi (2000). Illegitimate Cre-dependent chromosome rearrangements in transgenic mouse spermatids. *Proc. Natl. Acad. Sci. USA* **97**:13702-13707.

Gaufo, G. O., P. Flodby and M. R. Capecchi (2000). Hoxb1 controls effectors of sonic hedgehog and Mash1 signaling pathways. *Development* **127**:5343-5354.

Moon, A. M. and M. R. Capecchi (2000). Fgf8 is required for outgrowth and patterning of the limbs. *Nature Genet.* **26**:455-459.

Cole, J., D. Ertoy, H. Lin, R. L. Sutliff, E. Ezan, T. T. Guyene, M. R. Capecchi, P. Corvol, and K. E. Bernstein (2000). Mice deficient in angiotensin converting enzyme (ACE) have anemia due to a lack of angiotensin II facilitated erythropoiesis. *J. Clin. Invest.* **106**:1391-1398.

Manley, N. R., J. R. Barrow, T. Zhang and M. R. Capecchi (2001). *Hoxb2* and *Hoxb4* act together to specify ventral body wall formation. *Dev. Biol.* **237**:130-144.

Stadler, H. S., K. M. Higgins and M. R. Capecchi (2001). Loss of *Eph-receptor* expression correlates with loss of cell adhesion and chondrogenic capacity in *Hoxa13*mutant limbs. *Development* **128**:4177-4188.

Capecchi, M.R. (2001). Gene targeting: Altering the genome in mice. *Ergito.* http://www.ergito.com/main.jsp?bcs=EXP.3.4

Capecchi, M.R. (2001). Generating mice with targeted mutations. *Nature Med.* **7:**1086-1090.

Publications: (cont'd)

Cole, J., D. L. Quach, K. Sundaram, P. Corvol, M. R. Capecchi and K. E. Bernstein (2002). Mice lacking endothelial ACE have a normal blood pressure. *Circ. Res*. **90:**87-92.

Greer, J. M. and M. R. Capecchi (2002). *Hoxb8* is required for normal grooming behavior in the mouse. *Neuron* **33**:23-34.

Wellik, D. M., P. J. Hawkes and M. R. Capecchi (2002). *Hox11* paralogous genes are essential for metanephric kidney induction. *Genes Dev.* **16**:1423-1432.

Hobbs, N. K., A. A. Bondareva, S. Barnett, M. R. Capecchi and E. E. Schmidt (2002). Removing the vertebrate-specific TBP N-terminus disrupts placental β2m-dependent interactions with the maternal immune system. *Cell* **110**:43-54.

Boulet, A. M. and M. R. Capecchi (2002). Duplication of the *Hoxd11*gene causes alterations in the axial and appendicular skeleton of the mouse. *Dev. Biol.* **249**:96-107.

Frank, D. U., L. K. Fotheringham, J. A. Brewer, L. J. Muglia, M. Tristani-Firouzi, M. R. Capecchi and A. M. Moon (2002). An *Fgf8* mouse mutant phenocopies human 22q11 deletion syndrome. *Development* **129**:4591-4603.

Vorbach, C., A. Scriven and M. R. Capecchi (2002). The housekeeping gene *Xanthine Oxidoreductase* is necessary for milk fat droplet enveloping and secretion: gene sharing in the lactating mammary gland. *Genes Dev.* **16**:3223-3235.

Barrow, J. R., K. R Thomas, O. Boussadia-Zahui, R. Moore, R. Kemler, M. R. Capecchi, and A. P. McMahon (2003). Ectodermal *Wnt3/β-catenin* signaling is required for the establishment and the maintenance of the apical ectodermal ridge. *Genes Dev.* **17**:394-409.

Schmidt, E. E., A. A. Bondareva, J. R. Radke and M. R. Capecchi (2003). Fundamental cellular processes do not require vertebrate-specific sequences within the TATA-binding protein. *J. Biol. Chem.* **278**:6168-6174.

Economides, K. D., L. Zeltser and M. R. Capecchi (2003). *Hoxb13* mutations cause overgrowth of caudal spinal cord and tail vertebrae. *Dev. Biol.* **256**:317-330.

Cole J., N. Khokhlova, R. L. Sutliff, J. W. Adams, K. M. Disher, H. Zhao, M. R. Capecchi, P. Corvol and K. E. Bernstein (2003). Mice lacking endothelial angiotensin-converting enzyme (ACE): normal blood pressure with elevated angiotensin II. *Hypertension* **41**:313-321.

Economides, K. R. and M. R. Capecchi (2003). *Hoxb13* is required for normal differentiation and secretory function of the ventral prostate. *Development* **130**:2061-2069.

Arenkiel, B. R., G. O. Gaufo and M. R. Capecchi (2003). Hoxb1 neural crest preferentially form glia of the PNS. *Dev. Dynamics* **227**:379-386.

Publications: (cont'd)

Wellik, D. M. and M. R. Capecchi (2003). Hox10 and Hox11 genes are required to globally pattern the mammalian skeleton. *Science* **301**:363-367.

Vorbach, C., R. Harrison and M. R. Capecchi (2003). Xanthine oxidoreductase is central to the evolution and function of the innate immune system. *Trends Immunol.* **29**:512-517.

Gaufo, G. O., K. R. Thomas and M. R. Capecchi (2003). Hox3 genes coordinate mechanisms of genetic suppression and activation in the generation of branchial and somatic motor neurons. *Development* **130**:5191-5201.

Wong, K. H. H., H. D. Wintch and M. R. Capecchi (2004). *Hoxa11* regulates stromal cell death and proliferation during neonatal uterine development. *Molec. Endocrin.* **18**:184-193.

Boulet, A. M. and M. R. Capecchi (2004). Multiple roles of *Hoxa11* and *Hoxd11* in the formation of the mammalian forelimb zeugopod. *Development* **131**:299-309.

Westerberg, R., P. Tvrdik, A. B. Unden, J. E. Mansson, L. Norlen, A. Jakobsson, W. H. Holleran, P. M. Elias, A. Asadi, P. Flodby, R. Toftgard, M. R. Capecchi and A. Jacobsson (2004). Role for ELOVL3 and fatty acid chain length in development of hair and skin function. *J. Biol. Chem.* **279**:5621-5629.

Gaufo, G.O., S. Wu and M. R. Capecchi (2004). Contribution of *Hox* genes to the diversity of the hindbrain sensory system. *Development* **131**:1259-1266.

Fuchs, S., H. D. Xiao, J. W. Adams, K. Frenzel, G. Keshelava , M. R. Capecchi , P. Corvol and K. E. Bernstein (2004). Role of the N-terminal catalytic domain of ACE investigated by targeted inactivation in mice. *J. Biol. Chem*. **279**:15946-15953.

Arenkiel, B. R., P. Tvrdik, G. O. Gaufo and M. R. Capecchi (2004). Hoxb1 functions in both motoneurons and tissues of the periphery to establish and maintain the proper neuronal circuitry. *Genes Dev.* **18**:1539-1552.

Boulet, A. M., A. M. Moon, B. R. Arenkiel and M. R. Capecchi (2004). The roles of *Fgf4* and *Fgf8* in limb bud initiation and outgrowth. *Dev. Biol.* **273**:361-372.

Xiao, H. D., S. Fuchs, D. J. Campbell , W. Lewis, S. C. Dudley, Jr., V. S. Kasi, B. D. Hoit, G. T. Keshelava , H. Zhao, M. R. Capecchi and K. E. Bernstein (2004). Mice with cardiac restricted angiotensin converting enzyme (ACE) have atrial enlargement and sudden death. *Am. J. Path*. **165**:1019-1032.

Keller, C., M. S. Hansen, C. M. Coffin and M. R. Capecchi (2004). *Pax3:Fkhr* interferes with embryonic *Pax3* and *Pax7* function: implications for alveolar rhabdomyosarcoma cell of origin. *Genes Dev.* **18**:2608-2613.

Keller, C., B. R. Arenkiel, C. M. Coffin, N. El-Bardeesy, R. A. DePinho and M. R. Capecchi (2004). Alveolar rhabdomyosarcomas in conditional *Pax3:Fkhr* mice:

Publications: (cont'd)

cooperativity of Ink4a/ARF and Trp53 loss of function. *Genes Dev.* **18**:2614-2626.

Capecchi, M.R. (2005). Essay: Gene targeting in mice: functional analysis of the mammalian genome for the twenty-first century. *Nat Rev Genet.* 2005 Jun;6(6):507-12.

Schindehutte J, H. Fukumitsu, P. Collombat, G. Griesel, C. Brink, P.C. Baier, M.R. Capecchi, and A. Mansouri (2005). In vivo and in vitro tissue-specific expression of green fluorescent protein using the cre-lox system in mouse embryonic stem cells. *Stem Cells*, 23(1), 10-15.

Keller, C.B. and M.R. Capecchi. (2005) New Genetic Tactics to Model Alveolar Rhabdomyosarcoma in the Mouse. *Cancer Res*. Sept. 1; **65**(17):7530-32.

Kindlmann G.L., D.M. Weinstein, G.M. Jones, C.R. Johnson, M.R. Capecchi, and C. Keller. (2005) Practical vessel imaging by computed tomography in live transgenic mouse models for human tumors. *Molecular Imaging*. Oct-Dec;4(4):417-24

Fuchs, S., K. Frenzel K., C. Hubert, R. Lyng, L. Muller, A. Michaud, H.D. Xiao, J.W. Adams, M.R. Capecchi, P. Corvol, B.D. Shur, and K.E. Bernstein (2005). Male fertility is dependent on dipeptidase activity of testis ACE. *Nat Med.* Nov;11(11):1140-2.

Wu, S., Y. Wu, and M.R. Capecchi (2006). Motoneurons and oligodendrocytes are sequentially generated from neural stem cells but do not appear to share common lineage-restricted progenitors in vivo. *Development* 133, 581-590.

Johnson, J.T., M.S. Hansen, I. Wu, L.J. Healy, C.R. Johnson, G.M. Jones, M.R. Capecchi, and C. Keller (2006). Virtual histology of transgenic mouse embryos for high-throughput phenotyping. *PLoS.* Apr;2(4):e61.

Westerberg, R., J.E. Mansson, V. Golozoubova, I.G. Shabalina, E.C. Backlund, P. Tvrdik, K. Retterstol, M.R. Capecchi, and A. Jacobsson (2006). ELOVL3 is an important component for early onset of lipid recruitment in brown adipose tissue. *J Biol Chem*. Feb. 24;281(8):4958-68.

Vorbach, C., M.R. Capecchi, and J.M. Penninger (2006). Evolution of the mammary gland from the innate immune system? *Bioessays*. Jun;28(6):606-16.

Tvrdik, P. and M.R. Capecchi (2006). Reversal of *Hox1* gene subfunctionalization in the mouse. *Dev Cell.* Aug;11(2):239-50.

6/06