

# Robert M. Horton, PhD

## Curriculum vitae

### Contact information

**Work:**

Attotron Biotechnologies Corporation  
2533 North Carson Street, #A381  
Carson City, NV 89706  
rmhorton@attotron.com

**Home:**

263 Donahue St.  
Sausalito, CA 94965  
phone: (415) 332-6864

### Education

- 2005 M.S., California State University, Sacramento, Computer Science.  
1991 Ph.D. Mayo Graduate School, Biomedical Sciences / Molecular Biology .

### Experience

- 1997-present Founder and Director of Research, Attotron Biosensor Corporation (now Attotron Biotechnologies): Attotron is the creator of the Cybertory Virtual Molecular Biology Laboratory™, an on-line, simulation-based platform for teaching molecular genetics and bioinformatics using problem-solving exercises (cybertory.com).
- 2001-2004 Adjunct Professor, College of Engineering and Computer Science, California State University, Sacramento (Instructor, Bioinformatics graduate course CSC296N/BIO296C).
- 2000-2001 Technical Editor, Dermatology OnLine Journal
- 1999-2001 Guest lecturer in Medical Informatics, University of California, Davis (lecture & labs on Perl and Javascript, MDI280).
- 1996-1997 Adjunct Assistant Professor, Department of Dermatology, University of California, Davis.
- 1995-1996 Research Associate/Assistant Professor, Department of Dermatology, University of Minnesota.
- 1994-1995 Instructor in Biochemistry, University of Minnesota Extension.
- 1990-1995 Postdoctoral fellow, Department of Biochemistry, University of Minnesota.

### Computational Skills

Programming in Perl, Javascript, Flash, C/C++, R, SQL (Postgresql, MySQL), XML (XSLT, SVG), Java, Python, PHP

### Web Sites

cybertory.org Educational Molecular Biology Simulations

cybertory.com Virtual Molecular Biology Laboratory

simzymes.com Virtual Reagent Catalog (for virtual lab configuration)

## Patent

Ho, S.N. and Horton, R.M. "Method for gene splicing by overlap extension using the polymerase chain reaction". U.S. Patent No. 5023171, June 11, 1991. (over \$12M in royalties to Mayo)

## Awards and grants

- 2002-2005 National Center For Research Resources Small Business Innovation Phase II Research Grant "Virtual Laboratory Molecular Biology Teaching Software", award #2R44RR13645-02 (PI), \$747,429
- 1998 - 1999 National Center For Research Resources Small Business Innovation Phase I Research Grant "Virtual Laboratory Molecular Biology Teaching Software", award #1R43RR13645-01 (PI), \$98,300
- 1994 Travel grant, American Society for Biochemistry and Molecular Biology, International Congress of Biochemistry, New Delhi, India
- 1992-1995 Robert G. Sampson Neuromuscular Disease Research Fellow, Muscular Dystrophy Association.
- 1992-1994 National Science Foundation - Instrumentation and Laboratory Improvement grant "A Revitalized Biochemistry Laboratory", award #9250473 (Co-PI).
- 1989 Travel grant, American Association of Immunologists, International Congress of Immunology, Berlin, FRG.

## Publications

### Scientific papers:

- Horton, R.M. Simulation of "Single Molecule Real Time" (SMRT) sequencing, and data transformations for use with existing workflow tools. *Computational Systems Bioinformatics Conference CSB2010 Proceedings* (CD-ROM), 2010.
- Troup, C.B., Martin, B., McMillan, C.E., and Horton, R.M. Simulated Pharmacogenomics Exercises for the Cyberorty™ Virtual Molecular Biology Laboratory. *IEEE Computational Systems Bioinformatics Conference CSB2005 Proceedings*, pp. 124-125, 2005.
- Martin, B. and Horton, R.M. A Java Program to Create Simulated Microarray Images. *IEEE Computational Systems Bioinformatics Conference CSB2004 Proceedings*, pp. 564-565, 2004
- Martin, W. and Horton, R.M. MageBuilder: A Schema Translation Tool for Generating MAGE-ML from Tabular Microarray Data., *IEEE Computer Society Computational Systems Bioinformatics Conference CSB2003 Proceedings*, pp. 431-432. 2003.
- McMillin, CE. and Horton R.M. The Cyberorty Sequence File System for Managing Large DNA Sequences. *IEEE Computer Society Computational Systems Bioinformatics Conference CSB2003 Proceedings*. pp. 547-548, 2003.
- Maus A.D., Pereira E.F., Karachunski P.I., Horton R.M., Navaneetham D., Macklin K, Cortes W.S., Albuquerque E.X., Conti-Fine B.M. Human and rodent bronchial epithelial cells express functional nicotinic acetylcholine receptors. *Mol Pharmacol* 1998 Nov;54(5):779-88.
- Raju R., Navaneetham D., Protti M.P., Horton R.M., Hoppe B.L., Howard J. Jr., and Conti-Fine B.M.

- Acetylcholine receptor-specific CD4+ T cells in myasthenia gravis patients have individual, but restricted TCR V beta usage. *Ann N Y Acad Sci* 841:324-8, 1998.
- Horton, R.M., Raju, R., and Conti-Fine, B.M. Designing PCR primers to amplify specific members or subgroups of multigene families. *Methods Mol Biol* 67:459-479, 1997.
- Horton, R.M. In vitro recombination and mutagenesis of DNA. SOEing together tailor-made genes. *Methods Mol Biol* 67:141-149, 1997.
- Horton, R.M., Raju, R., and Conti-Fine, B.M. A T-linker strategy for modification and directional cloning of PCR products. *Methods Mol Biol* 67:101-110, 1997.
- Raju, R., Navaneetham, D., Protti, M.P., Horton, R.M., Hoppe, B.L., Howard, J., Jr, and Conti-Fine B.M. TCR V beta usage by acetylcholine receptor-specific CD4+ T cells in myasthenia gravis. *J Autoimmun* 10(2):203-217, 1997.
- Grando, S.A. and Horton, R.M. The keratinocyte cholinergic system with acetylcholine as an epidermal cytotransmitter. *Current Opinion in Dermatology* 4:262-268, 1997.
- Grando, S.A., Horton, R.M., Mauro, T.M., Kist, D.A., Lee, T.X., Dahl, M.V. Activation of keratinocyte nicotinic cholinergic receptors stimulates calcium influx and enhances cell differentiation. *Journal of Investigative Dermatology* 107:412-418, 1996.
- Grando, S.A., Horton, R.M., Pereira, E.F.R., Diethelm-Okita, B.M., George, P.M., Albuquerque, E.X., and Conti-Fine, B.M. A nicotinic acetylcholine receptor regulating cell adhesion and motility is expressed in human epidermal keratinocytes *Journal of Investigative Dermatology* 105(6):774-781, 1995.
- Horton, R.M., Karachunski, P.I., and Conti-Fine, B.M. PCR screening of transgenic RAG-2 knockout immunodeficient mice. *BioTechniques* 19(5):690-691, 1995.
- Horton, R.M., Karachunski, P.I., Kellermann, S.-A., and Conti-Fine, B.M. Simple, inexpensive computerized rodent activity meters. *BioTechniques* 19(4):594-597, 1995.
- Horton, R.M. PCR-mediated recombination and mutagenesis: SOEing together tailor-made genes. *Molecular Biotechnology* 3(2):93-99, 1995. [reprint]
- Horton, R.M., Conti-Tronconi, B.M., and Manfredi, A.A. ACh receptor in ocular MG. *Neurology* 44(4):778-779, 1994. [letter]
- Horton, R.M., Hoppe, B.L., and Conti-Tronconi, B.M. AmpliGrease:"Hot-start" PCR using petroleum jelly. *BioTechniques* 16(1):42-43, 1994.
- Protti, M.P., Manfredi, A.A., Horton, R.M., Bellone, M., and Conti-Tronconi, B.M. Myasthenia gravis: recognition of a human autoantigen at the molecular level [review]. *Immunol Today* 14(7):363-8, 1993.
- Pease, L.R., Horton, R.M., Pullen, J.K., and Yun, T.J. Unusual mutation clusters provide insight into class I gene conversion mechanisms. *Mol Cell Biol* 13(7):4374-81, 1993.
- Horton, R.M., Manfredi, A.A., and Conti-Tronconi, B.M. The 'embryonic' gamma subunit of the nicotinic acetylcholine receptor is expressed in adult extraocular muscle. *Neurology* 43(5):983-6, 1993.
- Pease, L.R., Horton, R.M., Pullen, J.K., Hunt, H.D., Yun, T.J., Rohren, E.M., Prescott, J.L., Jobe, S.M., and Allen, K.S. Amino acid changes in the peptide binding site have structural consequences at the

- surface of class I glycoproteins. *J. Immunol.* **150**:3375-81, 1993
- Horton, R.M., Ho, S.N., Pullen, J.K., Hunt, H.D., Cai, Z. and Pease, L.R. Gene splicing by overlap extension. *Meth. Enzymol.* **217**:270-9, 1993.
- Hoppe, B.L., Conti-Tronconi, B.M. and Horton, R.M. Gel-loading dyes compatible with PCR. *BioTechniques*, **12**(5):679-80, 1992.
- Pullen, J.K., Horton, R.M., Cai, Z. and Pease, L.R. Structural diversity of the classical H-2 genes: K, D, and L. *J. Immunol.* **148**: 953-967, 1992.
- Cai, Z., Pullen, J.K., Horton, R.M. and Pease, L.R. Specific amplification of cDNA from targeted members of multigene families. *Meth. Enzymol.* **216**:100-8, 1992.
- Hildebrand, W.H., Horton, R.M., Pease, L.R., and Martinko, J.M. Nucleotide sequence analysis of H-2D<sup>f</sup> and the spontaneous in vivo H-2D<sup>fm2</sup> mutation. *Mol Immunol* **29**(1):61-9, 1992.
- Horton, R.M., Loveland, B.E., Parwani, A., Pease, L.R. and Fisher Lindahl, K. Characterization of the spontaneous mutant H-2K<sup>bm29</sup> indicates that gene conversion in H-2 occurs at a higher frequency than detected by skin grafting. *J. Immunol.* **147**: 3180-3184, 1991.
- Pease, L.R., Horton, R.M., Pullen, J.K., and Cai, Z. Structure and diversity of class I antigen presenting molecules in the mouse. *CRC Crit. Rev. Immunol.* **11**(1):1-32, 1991.
- Horton, R.M., Hildebrand, W.H., Martinko, J.M., and Pease, L.R. Structural analysis of H-2K<sup>f</sup> and H-2K<sup>fm1</sup> by using H-2K locus-specific sequences. *J. Immunol.* **145**:1782-1787, 1990.
- Horton, R.M., Cai, Z., Ho, S.N., and Pease, L.R. Gene splicing by overlap extension: tailor-made genes using the polymerase chain reaction. *BioTechniques* **8**(5): 528-535, 1990.
- Ho, S.N., Pullen, J.K., Horton, R.M., Hunt, H.D. and Pease, L.R. DNA and protein engineering using the polymerase chain reaction: splicing by overlap extension. *DNA and Protein Engineering Techniques* **2**(2):50-55, 1990.
- Pullen, J.K., Hunt, H.D., Horton, R.M. and Pease, L.R. The functional significance of two amino acid polymorphisms in the antigen presenting domain of class I MHC molecules: molecular dissection of K<sup>bm3</sup>. *J. Immunol.* **143**:1674-1679, 1989.
- Horton, R.M., Hunt, H.D., Ho, S.N., Pullen, J.K. and Pease, L.R. Engineering hybrid genes without the use of restriction enzymes: gene splicing by overlap extension. *Gene* **77**:61-68, 1989.
- Ho, S.N., Hunt, H.D., Horton, R.M., Pullen, J.K. and Pease, L.R. Site-directed mutagenesis by overlap extension using the polymerase chain reaction. *Gene* **77**:51-59, 1989.
- Duran, L.W., Horton, R.M., Birschbach, C.W., Chang-Miller, A. and Pease, L.R. Structural relationships among the H-2 D-regions of murine MHC haplotypes. *J. Immunol.* **142**:288-296, 1989.

#### **Books:**

*The Internet for Molecular Biologists: A Practical Approach.* C.E. Sansom and R. M. Horton, eds. Oxford University Press, 2004.

*Genetic Engineering with PCR.* R.M. Horton and R.C. Tait, eds. Horizon Scientific Press, 1998.

## Book Chapters:

- Tait, R.C. and Horton, R.M. An introduction to genetic engineering with PCR. In: *Genetic Engineering with PCR*. pp 13-24. R.M. Horton and R.C. Tait, eds. Horizon Scientific Press, 1998.
- Horton, R.M. "In vitro recombination and mutagenesis of DNA: SOEing together tailor-made genes". In: *PCR Cloning Protocols: From Molecular Cloning to Genetic Engineering* (ed. Bruce A. White) pp. 141-149, Humana Press, 1996. [updated version of earlier work]
- Horton, R.M., Raju, R., and Conti-Fine, B.M. "Designing PCR primers for subfamily-specific amplification" In: *PCR Cloning Protocols: From Molecular Cloning to Genetic Engineering* (ed. Bruce A. White) pp. 459-479, Humana Press, 1996.
- Horton, R.M., Raju, R., and Conti-Fine, B.M. "A T-linker strategy for modification and directional cloning of PCR products" In: *PCR Cloning Protocols: From Molecular Cloning to Genetic Engineering* (ed. Bruce A. White) pp. 101-110, Humana Press, 1996.
- Horton, R.M. "In vitro recombination and mutagenesis of DNA: SOEing together tailor-made genes". In: *PCR: Selected Protocols and Applications* (ed. B.A. White) pp.251-261, Humana Press, 1993.
- Horton, R.M., and Pease, L.R. "Recombination and mutagenesis of DNA sequences using PCR". In: *Directed Mutagenesis: A Practical Approach*. (ed. M.J. McPherson) pp 217-247, IRL Press, 1991.
- Pease, L.R., Pullen, J.K., Cai, Z., and Horton, R.M. "Contributions of interlocus exchange to the structural diversity of the H-2K, D, and L alleles." In: *Molecular Evolution of the Major Histocompatibility Complex* (eds. J. Klein and D. Klein). NATO ASI series, vol. H59. Springer-Verlag, Berlin Heidelberg, 1991.
- Pullen, J.K., Hunt, H.D., Horton, R.M., and Pease, L.R. "The functional significance of amino acid polymorphisms in class I MHC molecules" In: *Transgenic Mice and Mutants in MHC Research*. (eds. C.S. David and I. Egorov) Springer-Verlag Co., Berlin, FRG, 1989.
- Hunt, H.D., Pullen, J.K., Cai, Z., Horton, R.M., Ho, S.N., and Pease, L.R. "Novel MHC variants spliced by overlap extension". In: *Transgenic Mice and Mutants in MHC Research*. (eds. C.S. David and I. Egorov) Springer-Verlag Co., Berlin, FRG, 1989.

## Internet articles:

- Horton, R.M. Biological Sequence Analysis Using Regular Expressions. *BioTechniques* **27**:76-78, July 1999.
- Horton, R.M. Scripting Wizards for Chime™ and RasMol. *BioTechniques* **26**:874-876, May 1999.
- Horton, R.M. A JavaScript Program for Browser-Based Presentations. *BioTechniques* **26**:456-458, March 1999.
- Horton R.M. Computer hardware resources on the internet. *Biotechniques* **25**(5):804-806, November 1998.
- Horton, R.M. and Gundling, K.E. Clinical cancer trial information and specimen resources. *BioTechniques* **25**(3): 396-398, September 1998.
- Horton, R.M., and Russell, M.J. Making client-side image maps. *BioTechniques* **25**(1):58-60, July, 1998.
- Horton, R. M. Conference Information on the Internet. *BioTechniques* **24**:772-774, May 1998.

- Horton, R. M. and Stone, R. J. S. PCR Master Mix Volume Calculators in JavaScript™. *BioTechniques* **24**:420-422, March 1998.
- Peterson, H. H. and Horton, R.M. Powerful Presentations with Microsoft PowerPoint. *BioTechniques*, January 1998.
- Horton, R.M. Interactive Internet Instruction: Web Quizzes and a New JavaScript Quizmaker. *BioTechniques* **23**(6):1048-1050, December 1997.
- Horton, R.M. Computer viruses. *BioTechniques* **23**(5), November 1997.
- Horton, R.M. Grant Information on the Internet. *BioTechniques* **23**(4), October 1997.
- Horton, R.M. Entering sequences into GenBank. *BioTechniques* **23**(3): 440-442, September 1997.
- Horton, R.M. and Gundling, K.E. Advanced Medline searches with PubMed. *BioTechniques* **23**(2): 258-260, August 1997.
- Horton, R.M. and Gundling, K.E. Searching Medline for free: An introduction to PubMed. *BioTechniques* **23**(1): 106-108, July 1997.
- Horton, R.M. Sharing your bookmarks. *BioTechniques* **22**(6): 1092-1094, June 1997.
- Horton, R.M. and Stone, R.J.S. Molecules on web pages: the Chime molecule viewer plug-in. *BioTechniques* **22**(5):884-886, May 1997.
- Horton, R.M. and Stone, R.J.S. An introduction to molecular visualization: Seeing in stereo with RasMol. *BioTechniques* **22**(4), in press, April 1997.
- Herron, M.J. and Horton, R.M. Telecollaboration software I: Reach out and show someone. *BioTechniques* **22**(2):284-286, February 1997.
- Horton, R.M. Java and JavaScript applications in biomedical research. *BioTechniques* **21**(5):634-636, November 1996.
- Horton, R.M. Putting your laboratory's pages on the World Wide Web. *BioTechniques* **21**(4):438-440, October 1996.
- Horton, R.M. How to write a laboratory web page: the basics. *BioTechniques* **21**(2):240-242, August 1996.
- Horton, R.M. Why to set up a laboratory web page. *BioTechniques* **21**(1):74-76, July 1996.
- Horton, R.M. and Karachunski, P.I. Personalizing your Internet environment on a shared computer. *BioTechniques* **20**(6):996-998, June 1996.
- Horton, R.M. How to send a picture by E-mail. *BioTechniques* **20**(5):818-820, May 1996.
- Horton, R.M. Searching the Internet. *BioTechniques* **20** (3):406-408, March 1996.
- Horton, R.M. Free books! Free Software! Files and more using FTP. *BioTechniques* **20** (2): 202-204, February 1996.
- Horton, R.M. Using newsgroups: virtual conferences on specialized topics. *BioTechniques* **20** (1): 62-64, January 1996.
- Horton, R.M. Introduction to the Internet. *BioTechniques* **19** (6):920-922, December 1995.