

Randall J. Roper, Ph.D.

723 W. Michigan Street, SL306, Indianapolis, IN 46202

W# 317.274.8131

rjroper@iupui.edu

Career Summary

Ph.D. level bilingual scientist with 20 years diverse scientific expertise spanning complex genetic disorders, molecular biology and immunology, and microbiology. Demonstrated ability to build functional cross-disciplinary teams and act as a bridge builder, consultant and liaison between scientists, thought and business leaders, and community partners. Proven track record in data analysis, distillation of results and clear communication of facts.

Professional Experience

Indiana University-Purdue University Indianapolis, August 2006–Present

Third-ranked in U.S. News and World Report's "Up and Coming US Universities", IUPUI has 22,100 undergraduate and 8,200 graduate students. The Department of Biology, with 25 full time faculty, is known for interdisciplinary research, state of the art teaching and exceptional research training.

Associate Professor of Genetics

September 2012 – Present

Adjunct Associate Professor of Biomedical Engineering

September 2012 – Present

Assistant Professor of Genetics

August 2006 – August 2012

Manage and lead project teams of ~10 individuals in a wide variety of genetics, development and molecular biology research. Investigate the complex genetics of how Trisomy 21 leads to facial and bone abnormalities associated with Down syndrome. Develop and test preclinical translational drug therapies to correct bone deficits. Collaborate nationally and internationally with computer scientists, psychologists, statisticians, and geneticists to accomplish multidisciplinary disease-related projects. Mentored and trained 8 graduate and ~40 undergraduate students in hypothesis-based laboratory research in complex genetics. Teach interactive, highly student-rated (> 4.5/5) classes about 40 Mendelian, chromosomal and complex genetic disorders, and the immunological response to biomaterials. Insure regulatory compliance at lab and university levels.

- Recipient of the IUPUI Trustees Teaching Award, IUPUI Center for Research and Learning Directors Leadership and Mentoring Award, LSAMP Minority Student Mentoring Award, and College Mentors for Kids Inspire Finalist Award
- Published 17 research papers, presented 27 invited talks at universities & regional, national and international conferences communicating the complex genetic features of Down syndrome
- Consistent record of successfully obtaining and completing research grants from several institutions including the National Institutes of Health and Jerome Lejuene Foundation
- Chair of the Biology Graduate Recruitment Committee, Faculty and Staff Awards Committee, and Graduate Qualifying Exam Committee
- Search Committee member for 4 new Biology faculty members and for the new department chair

Marathon Development Corp., Carmel, IN

April 2008 – March 2010

Management consulting company consisting of the managing director, a partner, research group director and 5 associates focused on marketing strategies and process improvement for executives and organizations.

Research Group Director

Analyzed and communicated additional funding and marketing opportunities for St. Vincent health care system and presented targeted funding initiatives to the executive team.

- Managed 2 associates in delivering data for targeted weekly research assignments
- Identified over \$50M in emerging research opportunities specific for goals of hospital departments

Johns Hopkins University School of Medicine, September 2001-August 2006

Ranked among the top 3 graduate medical schools in the US with 13,000 faculty and employees, and 2500 graduate and professional students, JHU receives over \$450M in federal funding, and claims 19 Nobel Prize winners. Home of McKusick-Nathans Institute of Genetic Medicine, a leader in solving genetic disorders.

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Postdoctoral Fellow

Effectively managed multiple research projects using mouse models of Down syndrome to identify and correct brain deficits. Used gene-targeting in mouse embryonic stem cells to make new models of Trisomy 21.

- First to experimentally verify the effect of trisomy on bone precursors including the neural crest in Down syndrome
- Published 4 scientific papers and presented 16 invited talks at university & regional, national and international conferences on the complex genetic effects on Down syndrome traits
- Consulted with and represented 1200 postdoctoral fellows as Vice President of Policy and liaison to Johns Hopkins Medical School Council and University Health Services Advisory Committees

University of Illinois Urbana-Champaign, August 1996-September 2001

Illinois' flagship university enrolls 32,000 undergraduate and 11,000 graduate and professional students, and spends over \$550M each year on research and development in Science and Engineering.

Research Assistant

Designed, developed and completed varied experiments to localize genes (quantitative trait loci or QTL) causing autoimmune disease in mouse models of Multiple Sclerosis, infertility, and Lyme arthritis. Project manager of team that verified the effect of genes on specific autoimmune phenotypes in mouse models.

- Awarded Segre Fellowship for outstanding academic merit and research potential
- Published 11 scientific articles describing complex genetics associated with autoimmunity
- Chaired the NIH Cell and Molecular Biology Training Grant symposium committee for 2 years

Freelance Spanish Interpreter February 1992-Present

Communicate fluently in Spanish to interpret for local and international companies.

- Consulted with Wordlink Consulting and traveled to Monterrey, Mexico and Rosario, Argentina to train Spanish speaking trainers at John Deere on new computer software (1998)
- Spanish liaison interpreter between management and workers at Bromley Farms from 1992-1996

Brigham Young University, Provo, UT May 1992-August 1996

BYU is the third largest private university in the US with 30,000 undergraduate students.

Research and Teaching Assistant

Integral member of interdisciplinary team identifying factors preventing microbial colonization and biofilm formation. Teacher and teaching assistant in Spanish and Immunology courses and microbiology laboratories.

- Awarded Trustees full tuition scholarship and undergraduate research fellowship
- Published a scientific paper as an undergraduate student

Education

Postdoctoral Fellow, Johns Hopkins Univ. School of Medicine, Baltimore, MD - August 2006

Ph.D., Immunology and Genetics, Univ. of Illinois Urbana-Champaign, Urbana, IL - Sept. 2001

Bachelor of Science, Micro and Molecular Biology, Brigham Young Univ., Provo, UT - May 1995

Memberships and Invited Reviews

Reviewer for 4 international grant panels and 11 scientific journals, Editorial Board for The Scientific World JOURNAL. American Association for the Advancement of Science (since 2000), American Society for Human Genetics (since 2006), Int'l Mammalian Genome Society (since 1998), Society for Developmental Biology (since 2006).

Additional Training

Summer Institute in Statistical Genetics - July 1998

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Publications

1. Pitt, W.G., M.O. McBride, J.K. Lunceford, **R.J. Roper**, and R.D. Sagers. 1994. Ultrasonic enhancement of antibiotic action on gram-negative bacteria. *Antimicrob. Agents Chemother.* 38:2577-2582.
2. Butterfield, R.J., J.D. Sudweeks, E.P. Blankenhorn, R.G. Korngold, J.C. Marini, J.A. Todd, **R.J. Roper**, and C. Teuscher. 1998. New genetic loci that control susceptibility and clinical symptoms of experimental allergic encephalomyelitis in inbred mice. *J. Immunol.* 161:1860-1867.
3. **Roper, R.J.**, R.W. Doerge, S.B. Call, K.S.K. Tung, W.F. Hickey, and C. Teuscher. 1998. Autoimmune orchitis, epididymitis, and vasitis are immunogenetically distinct lesions. *Am. J. Path.* 152:1337-1345.
4. Weis J., B.A. McCracken, Y. Ma, D. Fairbairn, J. Weis, **R.J. Roper**, J.F. Zachary, R.W. Doerge, and C. Teuscher. 1999. Identification of quantitative trait loci governing arthritis severity and humoral responses in the murine model of Lyme disease. *J. Immunol.* 162:948-956.
5. Butterfield, R.J., E.P. Blankenhorn, **R.J. Roper**, J.F. Zachary, R.W. Doerge, J.D. Sudweeks, J. Rose, and C. Teuscher. 1999. Genetic analysis of disease subtypes and sexual dimorphisms in mouse experimental allergic encephalomyelitis (EAE): relapsing/remitting and monophasic remitting/nonrelapsing EAE are immunogenetically distinct. *J. Immunol.* 162:3096-3102.
6. **Roper, R.J.**, J.S. Griffith, C.R. Lyttle, R.W. Doerge, A.W. McNabb, R.E. Broadbent, and C. Teuscher. 1999. Interacting quantitative trait loci control phenotypic variation in murine estradiol-regulated responses. *Endocrinology* 140:565-561.
7. Butterfield, R.J., E.P. Blankenhorn, **R.J. Roper**, J.F. Zachary, R.W. Doerge, and C. Teuscher. 2000. Genetic analysis of lesions in murine experimental allergic encephalomyelitis (EAE): identification of brain, spinal cord, and gender specific loci controlling lesion characteristics and severity. *Am. J. Path.* 157:637-645.
8. **Roper, R.J.**, J.J. Weis, B.A. McCracken, C.B. Green, Y. Ma, K.S. Weber, D. Fairbairn, R. J. Butterfield, M.R. Potter, J.F. Zachary, R.W. Doerge, and C. Teuscher. 2001. Genetic control of susceptibility to experimental Lyme arthritis is polygenic and exhibits consistent linkage to multiple loci on chromosome 5 in four independent mouse crosses. *Genes Immun.* 2:388-397.
9. Potter, M.R., S.R. Rittling, D.T. Denhardt, **R.J. Roper**, J.H. Weis, C. Teuscher, and J.J. Weis. 2002. Role of osteopontin in murine Lyme arthritis and host defense against *Borrelia burgdorferi*. *Infect. Immun.* 70:1372-1381.
10. Butterfield, R.J., **R.J. Roper**, D.M. Rhein, R.W. Melvold, L. Haynes, R.Z. Ma, R.W. Doerge, and C. Teuscher. 2002. Sex specific QTL govern susceptibility to Theiler's murine encephalomyelitis virus-induced demyelination (TMEVD). *Genetics* 163:1041-10466. (Butterfield and Roper are co-first authors).
11. **Roper, R.J.**, R.Z. Ma, J.E. Biggins, R.J. Butterfield, S.D. Michael, K.S.K. Tung, R.W. Doerge, and C. Teuscher. 2002. Interacting quantitative trait loci control loss of peripheral tolerance and susceptibility to autoimmune ovarian dysgenesis after day three thymectomy in mice. *J. Immunol.* 169:1640-1646.
12. **Roper, R.J.**, R.D. McAllister, J.E. Biggins, S.D. Michael, S.H. Min, K.S. Tung, S.B. Call, J Gao, and C. Teuscher. 2003. Aod1 controlling day 3 thymectomy-induced autoimmune ovarian dysgenesis in mice encompasses two linked quantitative trait loci with opposing allelic effects on disease susceptibility. *J Immunol.* 170:5886-91.
13. Olson, L.E., **R.J. Roper**, L.L. Baxter, E.J. Carlson, C.J. Epstein, and R.H. Reeves. 2004. Down Syndrome Mouse Models Ts65Dn, Ts1Cje, and MsiCje/Ts65Dn Exhibit Variable Severity of Cerebellar Phenotypes. *Dev Dyn.* 230:581-589.
14. **Roper, R.J.**, H.K. St. John, J. Philip, A. Lawler, and R.H. Reeves. 2006. Perinatal loss of Ts65Dn "Down syndrome" mice. *Genetics.* 172:437-443, Epub 2005 Sep 19.
15. **Roper, R.J.**, L.L. Baxter, N.G. Saran, D.K. Klinedinst, P.A. Beachy and R.H. Reeves. 2006. Defective cerebellar response to mitogenic Hedgehog signaling in Down syndrome mice. *Proc Natl Acad Sci USA.* 103:1452-1456, Epub 2006 Jan 23. (Roper and Baxter are co-first authors).
16. **Roper, R.J.** and R.H. Reeves. 2006. Understanding the basis for Down syndrome phenotypes. *PLoS Genet.* 2006; 2:e50.
17. Olson, L.E., **R.J. Roper**, C.L. Sengstaken, E.A. Peterson, V. Aquino, Z. Galdzicki, R. Siarey, M. Pletnikov, T.H. Moran and R.H. Reeves. 2007. Trisomy for the Down syndrome 'critical region' is necessary but not sufficient for brain phenotypes of trisomic mice. *Hum Mol Gen.* 16:774-82. Epub 2007 Mar 5.

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18. Rungta, N., H. Carroll, E.G. Mercer, **R.J. Roper**, M. Clement, and Q. Snell. 2007. Analyzing gene relationships for Down syndrome with labeled transition graphs. *FMCAD '07: Proceedings of the Formal Methods in Computer Aided Design*, IEEE Computer Society, Washington DC, pp 216-219.
19. Moore C.S. and **R.J. Roper**, 2007. The power of comparative and developmental studies for mouse models of Down syndrome. *Mamm Genome*. 18:431-43. Epub 2007 Jul 26. *Invited review for Mammalian Genome Special Issue "Comparative Analysis of Systems: From Genomes to Physiology."*
20. Samy E.T., K.M. Wheeler, **R.J. Roper**, C. Teuscher, and K.S. Tung. 2008. Cutting edge: autoimmune disease in day 3 thymectomized mice is actively controlled by endogenous disease-specific regulatory T cells. *J Immunol*. 180:4366-70.
21. **Roper, R.J.**, J.F. VanHorn, C. Cain, and R.H. Reeves. 2009. A neural crest deficit in Down syndrome mice is associated with deficient mitotic response to Sonic hedgehog. *Mech Dev*. 126:212-9. Epub 2008 Nov 21.
22. Clement K., N. Gustafson, A. Berbert, H. Carroll, C. Merris, A. Olsen, M. Clement, Q. Snell, J. Allen, and **R.J. Roper**. 2010. PathGen: A transitive gene pathway generator. *Bioinformatics*. 2010 Feb 1;26(3):423-5. Epub 2009 Dec 4. (12 pages of supplementary data at <http://bioinformatics.oxfordjournals.org/cgi/content/full/btp661/DC1>).
23. Lorenzi, H., N. Duvall, S.M. Cherry, R.H. Reeves, and **R.J. Roper**. 2010. PCR prescreen for genotyping the Ts65Dn mouse model of Down syndrome. *Biotechniques*. 48(1):35-8.
24. Blazek, J.D., C.N. Billingsley, A. Newbauer, and **R.J. Roper**. 2010. Embryonic and not maternal trisomy causes developmental attenuation in the Ts65Dn mouse model for Down syndrome. *Dev Dyn*. 2010 239(6):1645-53.
25. Oviatt D., M. Clement , Q. Snell, K. Sundberg, C.W. Lai, J. Allen, and **R.J. Roper**. 2010. Inferring gene regulatory networks from asynchronous microarray data with AIRnet. *BMC Genomics*. 11(Suppl 2) S6:1-8.
26. Blazek, J.D., A. Gaddy, R. Meyer, **R.J. Roper**, and J. Li. 2011. Disruption of bone homeostasis by trisomy in Ts65Dn Down syndrome mice. *Bone* 48:275-280 Epub 2010 Sep 24.
27. Allen, J.R., J.E. Buckingham, **R.J. Roper**, and K.A. Marrs. 2010. How Middle School Students Come Face to Face with Down Syndrome Research. *Science Scope*. 33:20-25.
28. Deitz, S.L. and **R.J. Roper**. 2011. Trisomic and allelic differences influence phenotypic variability during development of Down syndrome mice. *Genetics*. 2011; 189:1487-95. Epub 2011 Sep 16.
29. Reinholdt L.G., Y. Ding, G. Gilbert, A. Czechanski, J.P. Solzak, **R.J. Roper**, M.T. Johnson, L.R. Donahue, C. Lutz, and M.T. Davisson. 2011. Molecular characterization of the translocation breakpoints in the Down syndrome mouse model, Ts65Dn. *Mamm Genome*. 2011 22:685-91. Epub 2011 Sep 28.
30. Deitz, S.L., J.D. Blazek, J.P. Solzak and **R.J. Roper**. 2011. Down Syndrome: A complex and interactive genetic disorder. Invited review in "Down Syndrome / Book 1" (ISBN 978-953-307-1458-1) InTech - Open Access Publisher.
31. Solzak J.P., Y. Liang, F.C. Zhou and **R.J. Roper**. 2013. Commonality in Down and fetal alcohol syndromes. *Birth Defects Res A Clin Mol Teratol*. 97:187-97. Epub 2013 Apr 3.
32. Billingsley C.N., J.A. Allen, S.L. Deitz, J.D. Blazek, D.D. Baumann, A. Newbauer, A. Darrah, B.C. Long, B. Young, M. Clement, R.W. Doerge, and **R.J. Roper**. 2013. Non-trisomic Homeobox Gene Expression during Craniofacial Development in the Ts65Dn Mouse Model of Down Syndrome. *Am J Med Genet A*. 161:1866-74. Epub 2013 Jul 10.

Invited Presentations

(Representative presentations from > 50 career total)

1. **Roper, R.J.** 2006. Neural crest deficit in craniofacial precursors of Down syndrome mice. The 20th International Mouse Genome Conference. (Charleston, SC). Co-author: R.H. Reeves.
2. **Roper, R. J.** 2006. Neural crest deficit in Down syndrome mice. Department of Cellular and Integrative Physiology, IUPUI (Indianapolis, IN).
3. **Roper, R.J.** 2007. Neural crest deficit in Down syndrome mice. 46th Annual Midwest Developmental Biology Meeting (Chicago, IL).
4. **Roper R.J.** 2007. Neural crest deficit in Down syndrome mice. Bioinformatics Seminar, Purdue University (West Lafayette, IN).

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5. **Roper R.J.** 2007. Mouse models of Down syndrome. Indianapolis DADS (Dads appreciating Down syndrome) Club (Indianapolis, IN).
6. VanHorn, J.F., P.A. Su, and **R.J. Roper**. 2007. *In vitro* confirmation of Down syndrome modifiers from pathway analyses. BIOT-07 Symposium (Colorado Springs, CO).
7. Deitz, S.L. and **R.J. Roper**. 2008. Altered development in a Down syndrome mouse model. National Conferences on Undergraduate Research (Salisbury, MD).
8. **Roper, R.J.** 2008. Neural crest deficit in Down syndrome mice associated with sonic hedgehog deficiency. Department of Medical and Molecular Genetics, Indiana University School of Medicine (Indianapolis, IN).
9. **Roper, R.J.** 2008. The ups and downs of Down syndrome mouse models Mouse models of Down syndrome. Indiana Chapter, American Association for Laboratory Animal Science (Indianapolis, IN).
10. **Roper, R.J.** 2008. Using mouse models of Down syndrome to investigate traits and potential therapies. Indiana Down Syndrome Foundation Parent Meeting (Indianapolis, IN).
11. **Roper R.J.** 2008. A shared approach to unraveling the origin of the distinct facial features associated with Down syndrome, School of Science Leading Alumni Briefing, Interdisciplinary Health Science Research at IUPUI, June 12, 2008, (Indianapolis IN).
12. **Roper, R.J.** 2009. Developmental and genetic origins of neural crest deficit in Down syndrome mice. Department of Computer Science, Brigham Young University (Provo, UT).
13. Blazek J., A. Newbauer, and **R.J. Roper**. 2009. Developmental Delay in the Ts65Dn mouse model of Down syndrome. 48th Annual Midwest Developmental Biology Meeting (Iowa City, IA).
14. Duvall N., S.B. Stone, C. Davis, M. Stanley, and **R. Roper**. 2009. A retrospective analysis of comorbid traits associated with craniofacial dysmorphology in infants with Down syndrome. 48th Annual Midwest Developmental Biology Meeting (Iowa City, IA).
15. **Roper, R.J.** 2009. Of mice and men: what a mouse can teach us about Down syndrome. International Mosaic Down Syndrome Society (Cincinnati, OH).
16. **Roper, R.J.**, M. Stanley, S. Stone, N. Duvall, C. Davis, C.N. Billingsley, J. Blazek, J. Allen, and J. VanHorn. 2009. Mice and men: face to face with Down syndrome. IUPUI Research Day (Indianapolis, IN).
17. **Roper, R.J.** 2009. *El ratón y el síndrome de Down* (The mouse and Down syndrome) *Cuenta Conmigo* (Meeting for Hispanic Parents of children with Down syndrome) Down Syndrome Indiana (Indianapolis, IN).
18. **Roper, R.J.** 2010. Altered mandibular development in Down syndrome linked to modified expression of non-trisomic genes. Department of Statistics, Purdue University (West Lafayette, IN).
19. Deitz, S.L., M. Day, and **R.J. Roper**. 2011. Molecular basis and modification of a neural crest deficit in a Down syndrome mouse model. Mouse Genetics 2011 (Washington, D.C.).
20. **Roper, R.J.** 2011. Genetic, molecular and structural alterations in mandibular development of Down syndrome mice. Department of Computer Science, Brigham Young University (Provo, UT).
21. Stanley M.A., **R.J. Roper**, N.E. Shepherd, C.M. Davis, M.J. Bull. 2011. Dysphagia in Young Infants with Down Syndrome. Society for Developmental and Behavioral Pediatrics (San Antonio, TX).
22. **Roper R.J.** 2011. Cutting edge treatments in Down syndrome. Indianapolis DADS (Dads Appreciating Down Syndrome) Club (Indianapolis, IN).
23. **Roper, R.J.** 2011. Using mouse models to understand craniofacial abnormalities associated with Down syndrome. Indiana Chapter, American Association for Laboratory Animal Science (Indianapolis, IN).
24. Blazek, J.D., A. Malik and **R.J. Roper**. 2012. Molecular Mechanisms Altering Skeletal Development and Homeostasis in Ts65Dn Down Syndrome Mice. The 2nd Annual Meeting of The Indiana Physiological Society (Muncie, IN).
25. **Roper, R.J.**, J.D. Blazek, and Ahmed Malik. 2012. Alterations in Skeletal Development and Homeostasis in Ts65Dn Down Syndrome Mice. 50th Annual Midwest Developmental Biology Meeting (Cincinnati, OH).
26. Blazek, J., J. Li and **R.J. Roper**. 2012. Treatment of Ts65Dn mice with Epigallocatechin Gallate Ameliorates the Abnormal Appendicular Skeletal Phenotype caused by Trisomy. 2012. 26th International Mammalian Genome Conference (St. Pete Beach, FL).
27. **Roper, R.J.** 2013. Commonality in Down and Fetal Alcohol Syndromes. Ann Daugherty Symposia for Basic Science and Addiction Recovery (Franklin, IN).