Steven J. Schrodi

CONTACT INFORMATION

Center for Precision Medicine Research
Marshfield Clinic Research Institute
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CITIZENSHIP

USA

RESEARCH INTERESTS

Genomics of Immune System Pathologies, Statistical Genetics, Disease Genetics Theory

ACADEMIC EMPLOYMENT

Associate Research Scientist **(2010 – Present)**
Principal Investigator
Laboratory of Immunopathology Genomics and Disease Genetics Theory
Center for Precision Medicine Research
Marshfield Clinic Research Institute

Faculty **(2013 – Present)**
Computation and Informatics in Biology and Medicine
University of Wisconsin-Madison

PREVIOUS POSITIONS

Senior Staff Scientist **(2008 – 2010)**
Statistical Genetics/Autoimmune Genetics
Celera, Alameda, CA

Staff Scientist **(2006 – 2008)**
Statistical Genetics/Autoimmune Genetics
Celera, Alameda, CA

Senior Scientist **(2001 – 2006)**
Statistical Genetics/Autoimmune Genetics
Celera, Alameda, CA

Research Scientist **(2000 – 2001)**
Human Genetics and Statistical Genetics
DNA Sciences, Fremont, CA

EDUCATION

Ph.D. Biological Sciences **2001**
University of California, Irvine
Dissertation: "Mathematical Models in Population Genetics, Molecular Evolution and Genomics"
Advisor: Professor Walter M. Fitch (Biological Sciences)
Co-Advisors: Assistant Professor Anthony D. Long (Biological Sciences)
Professor Weian Zheng (Mathematics)

M.S. Biological Sciences **1998**
University of California, Irvine
Advisor: Professor Richard R. Hudson

B.S. Genetics **1995**
University of California, Davis

Internship, Planetary Aeolian Geology **1992**
Theoretical Space Science Division
NASA Ames Research Center, Moffett Field, CA

HONORS AND AWARDS

Seven Issued US Patents, Inventor, 2010-2018

US Patent No. 10,006,088; Issued June 26, 2018
US Patent No. 9,371,565; Issued June 21, 2016
US Patent No. 8,975,022; Issued March 10, 2015
US Patent No. 7,993,833; Issued August 9, 2011
US Patent No. 7,947,451; Issued May 24, 2011
US Patent No. 7,863,021; Issued January 4, 2011
US Patent No. 7,833,706; Issued November 16, 2010

Twenty-one US Patent Applications, Inventor

Shanghai Association of Chinese Integrative Medicine, Keynote Speaker, 2018

CIBM Seminar, Invited Speaker, 2017

Marquette University Colloquium Keynote Speaker, 2016

Applera Demonstrated Noteworthy Achievement Award, 2007

Mapping *PTPN22* and *TRAF1* in rheumatoid arthritis in 2003
Mapping *IL23R*, *IL12B*, *IL13* in psoriasis in 2006

UCSF Frontiers in Neurology and Neuroscience, Keynote Speaker, 2005

Top 10 Arthritis Advances of 2004, Arthritis Foundation

Excellence in Research Award, NASA Ames Research Center

CITATION INDICIES

Citations	6328
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CONTRIBUTION TO SCIENCE

1. **Temporal Variation in DNA Substitution Processes**. Early in my career, I investigated theoretical models in population genetics and molecular evolution where I developed a novel method for testing competing models of DNA substitution processes through measuring temporal patterns of DNA substitution variation. Applying this to mammalian protein-coding sequence data, I discovered that leading models of molecular evolution were rejected in favor of models where selection coefficients vary slowly over time.

    a. **Schrodi, S.J.** (2001) *Mathematical models in population genetics, molecular evolution and genomics.* UMI Dissertation Services, Ann Arbor, MI.

2. **First Exome-wide Association Scan for a Common Disease: Discovery of *PTPN22* and *TRAF1* Rheumatoid Arthritis Susceptibility Genes.** In 2003, I led the design and analysis and interpreted results from the first large-scale, exome-wide SNP association scan of any disease using 30,000 putatively functional coding variants. This landmark study was the subject of *A Machine to Make a Future*, 2005, by Rabinow and Dan-Cohen, published by Princeton University Press. I tested initial findings in a replication sample set of severe rheumatoid arthritis. The study resulted in the discovery of the R620W polymorphism in the protein tyrosine phosphatase, *PTPN22*, being strongly correlated with RA susceptibility. The 620W allele was subsequently found to confer profound effects on T-cell activation, B-cell pruning, NK cell stimulation, and impact numerous other innate and adaptive immune responses. This work was deemed one of the top 10 arthritis advances of 2004 by the Arthritis Foundation. Further, I led a fine-mapping effort as part of the same study which discovered *TRAF1* haplotypes as critically important RA susceptibility alleles. I was placed as chief architect for all Applied Biosystems and Celera fine mapping studies. I was awarded two United States Patents and have eight pending United States Patent Applications describing this work.

    a. Begovich, A.B., Carlton, V.E., Honigberg, L.A., **Schrodi, S.J.**, et al. (2004) A missense single-nucleotide polymorphism in a gene encoding a protein tyrosine phosphatase (PTPN22) is associated with rheumatoid arthritis. *American Journal of Human Genetics*, 75(2), 330-337.

    b. Carlton, V.S., Hu, X., Chokkalingam, A.P., **Schrodi, S.J.**, et al. (2005) PTPN22 genetic variation: evidence for multiple variants associated with rheumatoid arthritis. *American Journal of Human Genetics*, 77(4), 567-581.

    c. Chang, M., Rowland, C.M., Garcia, V.E., **Schrodi, S.J.**, et al. (2008) A large-scale rheumatoid arthritis genetic study identifies association at chromosome 9q33.2. *PLoS Genetics*, 4(6), e1000107.

d. Begovich, A.B., Carlton V.E.H., **Schrodi S.J.**, Alexander H.C. (Filed Jan 30, 2003; Awarded Nov 16, 2010) *United States Patent* 7,833,706. Genetic polymorphisms associated with rheumatoid arthritis, methods of detection and uses thereof.

e. **Schrodi, S.J.** and Begovich, A.B. (Filed Sept 5, 2007; Awarded Jan 4, 2011) *United States Patent* 7,863,021. Genetic polymorphisms associated with rheumatoid arthritis, methods of detection and uses thereof.

3. **First Large-Scale Genetics Association Scan for Psoriasis: Discovery of *IL23R*, *IL12B* and *IL13* Psoriasis Susceptibility Genes**. Starting in 2005, I designed, managed and analyzed the first exome-wide association scan of psoriasis. I developed a novel, pooled, multi-staged experimental design to interrogate 30,000 putatively functional coding variants to study psoriasis etiology. The study confirmed the *IL12B*-association with psoriasis and was the first investigation to discover the involvement of *IL23R* variants in disease. The findings solidified the view that Th17 signaling plays a fundamental role in autoinflammatory conditions. In addition, the study discovered polymorphisms segregating at *IL13* playing a role in psoriasis-predisposition. The *IL12B/IL23R* findings provided evidence supporting the use of anti-IL-23 and anti-IL-17 monoclonal antibodies as targeted therapies for autoinflammatory diseases. I was awarded four United States Patents and have 13 pending United States Patent Applications describing these psoriasis and autoinflammatory disease results.

   a. Cargill, M.*, **Schrodi, S.J.***, Chang, M., Garcia, V.E., et al. (2007) A large-scale genetic association study confirms IL12B and leads to the identification of IL23R as psoriasis-risk genes. *American Journal of Human Genetics*, 80(2):273-290. (*Equal contributions)

   b. Garcia, V.E., Chang, M., Brandon, R., Li, Y.J., Matsunami, N., Callis-Duffin, K.P., Civello, D., Rowland, C.M., Bui, N., Catanese, J.J., Krueger, G.G., Leppert, M.F., Begovich, A.B., **Schrodi, S.J.**‡ (2008) Detailed genetic characterization of the interleukin-23 receptor in psoriasis. *Genes & Immunity*, 9(6):546-555. (‡Corr Author)

   c. Chang, M., Li, Y.J., Yan, C., Callis-Duffin, K.P., Matsunami, N., Garcia, V.E., Cargill, M., Civello, D., Bui, N., Catanese, J.J., Leppert, M.F., Krueger, G.G., Begovich, A.B., **Schrodi, S.J.** ‡ (2008) Variants in the 5q31 cytokine gene cluster are associated with psoriasis. *Genes & Immunity*, 9(2):176-181. (‡Corr Author)

   d. Nair, R.P., Duffin, K.C., Helms, C., …, **Schrodi, S.J.**, et al. (2009) Genome-wide scan reveals association of psoriasis with IL-23 and NF-kappaB pathways. *Nature Genetics*, 41(2):199-204.

   e. Tsoi, L.C., Spain, S.L., Knight, J., …**Schrodi, S.J.**, et al. (2012) Identification of 15 new psoriasis susceptibility loci highlights the role of innate immunity. *Nature Genetics*, 44(12):1341-1348.

4. **Statistical Genetics**. I have developed several novel statistical genetics methods and approaches to analyzing human genetics data. In 2000, I was recruited by Dr. Ray White to DNA Sciences where I developed and led a very large Monte Carlo simulation study involving several scientific programmers and a genetic epidemiologist to simulate disease genetics in extended kinships in an effort to inform the development of powerful mapping methods in homogeneous populations. Over the past 17 years, I have worked on methods of selecting tagging SNPs, TDT statistical approaches, Bayesian hypothesis testing, a Bayesian estimator for the prevalence of rare Mendelian diseases, software for next-generation sequence analysis, and multiple testing approaches.

   a. **Schrodi, S.J.**‡ (2005) A probabilistic approach to large-scale association scans: a semi-Bayesian method to detect disease-predisposing alleles. *Stat Appl Genet Mol Biol*, 4, Article 31. (‡Corr Author)

   b. **Schrodi, S.J.**‡, DeBarber, A., He, M., Ye, Z., et al. (2015). Prevalence estimation for monogenic autosomal recessive disease using population-based genetic data. *Human Genetics*, 134(6):659-669. (‡Corr Author)

   c. **Schrodi, S.J.**‡ (2016). The use of multiplicity corrections, order statistics and generalized family-wise statistics with application to genome-wide studies. *PLoS One* 11(4):e0154472. (‡Corr Author)

   d. **Schrodi, S.J.** ‡ (2017). The impact of diagnostic code misclassification on optimizing the experimental design of genetic association studies. *J Healthcare Engineering* 2017:Article ID 7653071. (‡Corr Author)

   e. Bansal NK, Maadooliat M, **Schrodi SJ**. (2018) Empirical Bayesian approach to testing multiple hypotheses with separate priors for left and right alternatives. *Stat Appl Genet Mol Biol* 17(4):20180002.

5. Disease Genetics Theory and Prediction of Disease Traits. My research on theoretical models of disease genetics has shown how LD with a causal site varies with mode of inheritance, including a mathematical formulation for precisely how disease association statistics decays as LD declines from a causal site. My colleagues and I have shown the utility of this work for developing new fine mapping approaches. Additionally, we have applied machine

learning techniques to utilize molecular markers for disease prognosis and information theory metrics for characterizing the predictive capacity of such models.

a. **Schrodi, S.J.**‡, Garcia, V.E., Rowland, C.M., Jones, H.B. (2007) Pairwise linkage disequilibrium under disease models. *Eur J Human Genetics*, 15(2), 212-220. (‡Corr Author)

b. **Schrodi, S.J.**‡, Mukherjee, S., Shan, Y., Tromp, G., et al. (2014) Genetic-based prediction of disease traits: prediction is very difficult, especially about the future. *Frontiers in Genetics*, 5:162. (‡Corr Author)

c. **Schrodi, S.J.**‡ (2016) Reflections on the field of human genetics: A call for increased disease genetics theory. *Frontiers in Genetics*, 7:106. (‡Corr Author)

d. Carter, T.C., Rein, D., Padberg, I., Peter, E., Rennefahrt, U., David, D.E., McManus, V., Stefanski, E., Martin, S., Schatz, P., **Schrodi S.J.**‡ (2016). Validation of a metabolite panel for early diagnosis of type 2 diabetes. *Metabolism*, 65(9):1399-1408. (‡Corr Author)

e. Maadooliat M., Bansal N.K., Updhya J., Farazi M.R., Li X., He M., Hebbring S.J., Ye Z., **Schrodi S.J.**‡ (2016) The decay of disease association with declining linkage disequilibrium: A fine mapping theorem. *Frontiers in Genetics*, 7:217. (‡Corr Author)

PUBLICATIONS

- Guo S, Carter TC, Ye Z, David D, Epperla N, Strenn R, Kitchner T, Mazza JJ, Fritsche TR, Haselby RC, Shukla SK, Yachoui RE, Meece JK, Huttenlocher A, Smith JA, **Schrodi SJ**‡. The genetics of baseline TH17 signaling cytokines: Interleukin-23 and interleukin-17A. (Manuscript in preparation) (‡Corr Author)
- **Schrodi SJ**‡. Prioritizing genetic markers in genome-wide studies based on the probability of replication. (Manuscript in preparation) (‡Corr Author)
- Guo S, Maadooliat M, Epperla N, Ye Z, Olson B, Kitchner T, Joyce J, Strenn R, Mazza JJ, Meece JK, Wang J‡, **Schrodi SJ**‡. A gene-based recessive diplotype exome scan discovers FGF6 as a novel hemochromatosis gene. (Manuscript in preparation) (‡Corr Authors)
- Ye Z, Pathak J, Mayer J, Cheng Y, **Schrodi SJ**, Hebbring SJ. Large-scale phenome-wide scan in twins helps identify candidate variants associated with seborrheic keratosis. (Manuscript Submitted)

50. Bansal NK, Maadooliat M, **Schrodi SJ**. (2018) Empirical Bayesian approach to testing multiple hypotheses with separate priors for left and right alternatives. *Stat Appl Genet Mol Biol* 17(4):20180002.
49. Liu Y, Ye Z, Li X, Anderson JL, Khan M, DaSilva D, Baron M, Wilson D, Bocoun V, Ivacic LC, **Schrodi SJ**, Smith JA. (2017) Genetic and functional associations with decreased anti-inflammatory Tumor Necrosis Factor Alpha Induced Protein 3 in macrophages from subjects with axial spondyloarthritis. *Front Immunol* 8:860.
48. **Schrodi SJ**‡. (2017) The impact of diagnostic code misclassification on optimizing the experimental design of genetic association studies. *J Healthc Eng* Vol2017:Artcle ID 7653071. (‡Corr Author)
47. Schotthoefer AM, **Schrodi SJ**, Meece JK, Fritsche TR, Shukla SK. (2017) Pro-inflammatory immune responses are linked to clinical signs and symptoms in human anaplasmosis. *PLoS ONE* 12(6): e0179655.
46. **Schrodi SJ**‡ (2017) Postmortem Genetic Testing for Sudden Unexpected Death. *JAMA* 317(3):320-321. (‡CA)
45. Maadooliat M, Bansal NK, Upadhya J, Farazi MR, Li X, He M, Hebbring SJ, Ye Z, **Schrodi SJ**‡. (2016) The decay of disease association with declining linkage disequilibrium: A fine mapping theorem. *Front Genet* 7:217. (‡CA)
44. **Schrodi SJ**‡. (2016) Reflections on the field of human genetics: A call for increased disease genetics theory. *Front Genet* 7:106. (‡Corr Author)
43. Carter TC, Rein D, Padberg I, Peter E, Rennefahrt U, David DE, McManus V, Stefanski E, Martin S, Schatz P, **Schrodi SJ**‡. (2016) Validation of a metabolite panel for early diagnosis of type 2 diabetes. *Metabolism* 65:1399-1408. (‡Corr Author)
42. **Schrodi SJ**‡**.** (2016) The use of multiplicity corrections, order statistics and generalized family-wise statistics in genome-wide studies. *PLoS ONE* 11(4):e0154472. (‡Corr Author)
41. Tokarz SA, DeValk J, Luo W, Pattnaik BR, **Schrodi SJ**, Pillers DM. (2016) Toll-like receptor genotype may influence cell line innate-immunity phenotype. *Mol Genet Metab* 118(3):147-152.

40. Brilliant MH, Vaziri K, Connor TB, Schwatrz SG, Carroll JJ, McCarty CA, **Schrodi SJ**, Hebbring SJ, Kishor KS, Flynn HW, Moshfeghi AA, Moshfeghi DM, Fini ME, McKay BS. (2016) Mining retrospective data for virtual prospective drug repurposing: L-DOPA and Age-related Macular Degeneration. *Am J Med* 129(3):292-298.

39. Shukla SK, Cook D, Meyer J, Vernon SD, Le T, Clevidence D, Robertson CE, **Schrodi SJ**, Yale S, Frank DN. (2015) Changes in gut and plasma microbiome following exercise challenge in myalgic encephalomyelitis/chronic fatigue syndrome (ME/CFS). *PLoS ONE* 10(12):e0145453.

38. **Schrodi SJ**‡ and Jones HB. (2015) Calculating exact P-values from the McNemar Transmission/Disequilibrium Test Statistic. *J Invest Genomics* 2(4):00032. (‡Corr Author)

37. Shukla SK, Rose W, **Schrodi SJ**. (2015) Complex host genetic susceptibility to Staphylococcus aureus infections. *Trends Microbiol.* 23(9):529-536.

36. **Schrodi SJ**‡, DeBarber A, He M, Ye Z, Peissig P, Van Wormer JJ, Haws R, Brilliant MH, Steiner RD. (2015) Prevalence estimation for monogenic autosomal recessive diseases using population-based genetic data. *Hum Genet.* 134(6):659-669. (‡Corr Author)

35. O'Brien SE, **Schrodi SJ**, Ye Z, Brilliant MH, Virani SS, Brautbar A. (2015) Differential lipid response to statins is associated with variants in the BUD13-APOA5 gene region. *J Cardiovasc Pharmacol.* 66(2):183-188.

34. He M, Person TN, Hebbring SJ, Heinzen E, Ye Z, **Schrodi SJ**, McPherson EW, Lin SM, Peissig PL, Brilliant MH, O'Rawe J, Robison RJ, Lyon GJ, Wang K. (2015) SeqHBase: a big data toolset for family based sequencing data analysis. *J Med Genet* 52(4): 282-288.

33. Ye Z, Mayer J, Ivacic L, Zhou Z, He M, **Schrodi SJ**, Page D, Brilliant MH, Hebbring SJ.(2015) Phenotype-wide association studies (PheWASs) for functional variants. *Eur J Hum Genet* 23(4):523-529.

32. Munro SA, Lund SP, Pine PS,…**Schrodi SJ**,…, Salit ML. (2014) Assessing technical performance in differential gene expression experiments with external spike-in RNA control ratio mixtures. NIST Publications.

31. Mayer J, Kitchner T, Ye Z, Zhou Z, He M, **Schrodi SJ**, Hebbring SJ. (2014) Use of an electronic medical record to create the marshfield clinic twin/multiple birth cohort*. Genet Epidemiol.* 38(8):692-698.

30. **Schrodi SJ**‡, Mukherjee S, Shan Y, Tromp G, Sninsky JJ, Callear AP, Carter TC, Ye Z, Haines JL, Brilliant MH, Crane PK, Smelser DT, Elston RC, Weeks DE. (2014) Genetic-based prediction of disease traits: prediction is very difficult, especially about the future*. Front Genet*. 5:162. (‡Corr Author)

29. Ye Z, Vasco DA, Carter TC, Brilliant MH, **Schrodi SJ**, Shukla SK.(2014) Genome wide association study of SNP-, gene-, and pathway-based approaches to identify genes influencing susceptibility to Staphylococcus aureus infections. *Front Genet.* 5:125.

28. Hebbring SJ, **Schrodi SJ**, Ye Z, Zhou Z, Page D, Brilliant MH. (2013) A PheWAS approach in studying HLA-DRB1*1501. *Genes Immun.* 14(3):187-191.

27. Hebbring SJ, Slager SL, Epperla N, Mazza JJ, Ye Z, Zhou Z, Achenbach SJ, Vasco DA, Call TG, Rabe KG, Kay NE, Caporaso NE, Lanasa MC, Camp NJ, Strom SS, Goldin LR, Cerhan JR, Brilliant MH, **Schrodi SJ**‡. (2013) Genetic evidence of PTPN22 effects on chronic lymphocytic leukemia. *Blood* 121(1):237-238. (‡Corr Author)

26. Tsoi LC, Spain SL, Knight J, Ellinghaus E,…,**Schrodi SJ**,.. Barker JN, Abecasis GR, Elder JT, Trembath RC. (2012) Identification of 15 new psoriasis susceptibility loci highlights the role of innate immunity. *Nat Genet.* 44(12):1341-1348.

25. Feng BJ, Sun LD, Soltani-Arabshahi R, Bowcock AM, Nair RP, Stuart P, Elder JT, **Schrodi SJ**, Begovich AB, Abecasis GR, Zhang XJ, Callis-Duffin KP, Krueger GG, Goldgar DE. (2009) Multiple loci within the major histocompatibility complex confer risk of psoriasis. *PLoS Genet* 5(8):e1000606.

24. Duffin KC, Freeny IC, **Schrodi SJ**, Wong B, Feng BJ, Soltani-Arabshahi R, Rakkhit T, Goldgar DE, Krueger GG. (2009) Association between IL13 polymorphisms and psoriatic arthritis is modified by smoking. *J Invest Dermatol.* 129(12):2777-2783.

23. Nair RP, Duffin KC, Helms C, Ding J, Stuart PE, Goldgar D, Gudjonsson JE, Li Y, Tejasvi T, Feng BJ, Ruether A, Schreiber S, Weichenthal M, Gladman D, Rahman P, **Schrodi SJ**, Prahalad S, Guthery SL, Fischer J, Liao W, Kwok PY, Menter A, Lathrop GM, Wise CA, Begovich AB, Voorhees JJ, Elder JT, Krueger GG, Bowcock AM, Abecasis GR; Collaborative Association Study of Psoriasis. (2009) Genome-wide scan reveals association of psoriasis with IL-23 and NF-kappaB pathways. *Nat Genet.* 41(2):199-204.

22. Li Y, Liao W, Chang M, **Schrodi SJ**, Bui N, Catanese JJ, Poon A, Matsunami N, Callis-Duffin KP, Leppert MF, Bowcock AM, Kwok PY, Krueger GG, Begovich AB. (2009) Further genetic evidence for three psoriasis-risk genes: ADAM33, CDKAL1, and PTPN22. *J Invest Dermatol.* 129(3):629-634.

21. **Schrodi SJ.**‡ (2008) Genome-wide association scan in psoriasis: new insights into chronic inflammatory disease. *Expert Rev Clin Immunol.* 4(5):565-571. (‡Corr Author)

20. Garcia VE, Chang M, Brandon R, Li Y, Matsunami N, Callis-Duffin KP, Civello D, Rowland CM, Bui N, Catanese JJ, Krueger GG, Leppert MF, Begovich AB, **Schrodi SJ.**‡ (2008) Detailed genetic characterization of the interleukin-23 receptor in psoriasis. *Genes Immun.* 9(6):546-555. (‡Corr Author)

19. Chang M, Rowland CM, Garcia VE, **Schrodi SJ**, Catanese JJ, van der Helm-van Mil AH, Ardlie KG, Amos CI, Criswell LA, Kastner DL, Gregersen PK, Kurreeman FA, Toes RE, Huizinga TW, Seldin MF, Begovich AB. (2008) A large-scale rheumatoid arthritis genetic study identifies association at chromosome 9q33.2. *PLoS Genet.* 4(6):e1000107.

18. Li Y, Rowland C, Xiromerisiou G, Lagier RJ, **Schrodi SJ**, Dradiotis E, Ross D, Bui N, Catanese J, Aggelakis K, Grupe A, Hadjigeorgiou G. (2008) Neither replication nor simulation supports a role for the axon guidance pathway in the genetics of Parkinson's disease. *PLoS ONE* 3(7):e2707.

17. Li Y, Chang M, **Schrodi SJ**, Callis-Duffin KP, Matsunami N, Civello D, Bui N, Catanese JJ, Leppert MF, Krueger GG, Begovich AB. (2008) The 5q31 variants associated with psoriasis and Crohn's disease are distinct. *Hum Mol Genet.* 17(19):2978-2985.

16. Chang M, Saiki RK, Cantanese JJ, Lew D, van der Helm-van Mil AH, Toes RE, Huizinga TW, Ardlie KG, Criswell LA, Seldin MF, Amos CI, Kastner DL, Gregersen PK, **Schrodi SJ**, Begovich AB. (2008) The inflammatory disease-associated variants in IL12B and IL23R are not associated with rheumatoid arthritis. *Arthritis Rheum.* 58(6):1877-1881.

15. Chang M, Li Y, Yan C, Callis-Duffin KP, Matsunami N, Garcia VE, Cargill M, Civello D, Bui N, Catanese JJ, Leppert MF, Krueger GG, Begovich AB, **Schrodi SJ**. (2008) Variants in the 5q31 cytokine gene cluster are associated with psoriasis. *Genes Immun.* 9(2):176-181.

14. Kurreeman FA, Padyukov L, Marques RB, **Schrodi SJ**, Seddighzadeh M, Stoeken-Rijsbergen G, van der Helm-van Mil AH, Allaart CF, Verduyn W, Houwing-Duistermaat J, Alfredsson L, Begovich AB, Klareskog L, Huizinga TW, Toes RE. (2007) A candidate gene approach identifies the TRAF1/C5 region as a risk factor for rheumatoid arthritis. *PLoS Med.* 4(9):e278.

13. Begovich AB, Chang M, **Schrodi SJ**. (2007) Meta-analysis evidence of a differential risk of the FCRL3 -169T→C polymorphism in white and East Asian rheumatoid arthritis patients. *Arthritis Rheum.* 56(9):3168-3171.

12. Cargill M*, **Schrodi SJ***, Chang M, Garcia VE, Brandon R, Callis KP, Matsunami N, Ardlie KG, Civello D, Catanese JJ, Leong DU, Panko JM, McAllister LB, Hansen CB, Papenfuss J, Prescott SM, White TJ, Leppert MF, Krueger GG, Begovich AB. (2007) A large-scale genetic association study confirms IL12B and leads to the identification of IL23R as psoriasis-risk genes. *Am J Hum Genet.* 80(2):273-290. (*Co-Lead Author)

11. **Schrodi SJ**‡, Garcia VE, Rowland C, Jones HB. (2007) Pairwise linkage disequilibrium under disease models. *Eur J Hum Genet.* 15(2):212-220. (‡Corr Author)

10. Li Y, **Schrodi S**, Rowland C, Tacey K, Catanese J, Grupe A. (2006) Genetic evidence for ubiquitin-specific proteases USP24 and USP40 as candidate genes for late-onset Parkinson disease. *Hum Mutat.*27(10): 1017-1023.

9. Huang H, Shiffman ML, Cheung RC, Layden TJ, Friedman S, Abar OT, Yee L, Chokkalingam AP, **Schrodi SJ**, Chan J, Catanese JJ, Leong DU, Ross D, Hu X, Monto A, McAllister LB, Broder S, White T, Sninsky JJ, Wright TL. (2006) Identification of two gene variants associated with risk of advanced fibrosis in patients with chronic hepatitis C. *Gastroenterology* 130(6):1679-1687.

8. Li Y, Rowland C, **Schrodi S**, Laird W, Tacey K, Ross D, Leong D, Catanese J, Sninsky J, Grupe A. (2006) A case-control association study of the 12 single-nucleotide polymorphisms implicated in Parkinson disease by a recent genome scan. *Am J Hum Genet.* 78(6):1090-1092.

7. **Schrodi SJ**‡ (2005) A probabilistic approach to large-scale association scans: a semi-Bayesian method to detect disease-predisposing alleles. *Stat Appl Genet Mol Biol* 4:Article 31. (‡Corr Author)

6. Carlton VE, Hu X, Chokkalingam AP, **Schrodi SJ**, Brandon R, Alexander HC, Chang M, Catanese JJ, Leong DU, Ardlie KG, Kastner DL, Seldin MF, Criswell LA, Gregersen PK, Beasley E, Thomson G, Amos CI, Begovich AB.

(2005) PTPN22 genetic variation: evidence for multiple variants associated with rheumatoid arthritis. *Am J Hum Genet.* 77(4):567-581.

5. Li Y, Nowotny P, Holmans P, Smemo S, Kauwe JS, Hinrichs AL, Tacey K, Doil L, van Luchene R, Garcia V, Rowland C, **Schrodi S**, Leong D, Gogic G, Chan J, Cravchik A, Ross D, Lau K, Kwok S, Chang SY, Catanese J, Sninsky J, White TJ, Hardy J, Powell J, Lovestone S, Morris JC, Thal L, Owen M, Williams J, Goate A, Grupe A. (2004) Association of late-onset Alzheimer's disease with genetic variation in multiple members of the GAPD gene family. *Proc Natl Acad Sci USA* 101(44):15688-15693.
4. Hu X, **Schrodi SJ**, Ross DA, Cargill M. (2004) Selecting tagging SNPs for association studies using power calculations from genotype data. *Hum Hered.* 57(3):156-170.
3. Li Y, Tacey K, Doil L, van Luchene R, Garcia V, Rowland C, **Schrodi S**, Leong D, Lau K, Catanese J, Sninsky J, Nowotny P, Holmans P, Hardy J, Powell J, Lovestone S, Thal L, Owen M, Williams J, Goate A, Grupe A. (2004) Association of ABCA1 with late-onset Alzheimer's disease is not observed in a case-control study. *Neurosci Lett.* 366(3):268-271.
2. Begovich AB, Carlton VE, Honigberg LA, **Schrodi SJ**, Chokkalingam AP, Alexander HC, Ardlie KG, Huang Q, Smith AM, Spoerke JM, Conn MT, Chang M, Chang SY, Saiki RK, Catanese JJ, Leong DU, Garcia VE, McAllister LB, Jeffery DA, Lee AT, Batliwalla F, Remmers E, Criswell LA, Seldin MF, Kastner DL, Amos CI, Sninsky JJ, Gregersen PK. (2004) A missense single-nucleotide polymorphism in a gene encoding a protein tyrosine phosphatase (PTPN22) is associated with rheumatoid arthritis. *Am J Hum Genet*. 75(2):330-337.
1. **Schrodi SJ.** (2001) Mathematical models in population genetics, molecular evolution and genomics. UMI Dissertation Services. Ann Arbor, MI, USA.

BOOK CHAPTER

- **Schrodi SJ**. (2012) Oral Health in the Age of Genome-Wide Studies. In: *Integration of Medical and Dental Care and Patient Data: Progress in Health Care Informatics.* Eds: Powell, Din, Acharya, Torres-Urquidy. United Kingdom: Springer London.

INTELLECTUAL PROPERTY
Issued US Patents

- Begovich A, Beasley E, Cargill M, **Schrodi S**. US Patent 10,006,088; Issued June 26, 2018.
- Begovich A, Beasley E, Cargill M, **Schrodi S**. US Patent 9,371,565; Issued June 21, 2016.
- Begovich A, Beasley E, Cargill M, **Schrodi S**. US Patent 8,975,022; Issued March 10, 2015.
- Begovich A, Beasley E, Cargill M, **Schrodi S**. US Patent 7,993,833; Issued August 9, 2011.
- Li Y, Begovich A, Chang M, Cargill M, **Schrodi S**. US Patent 7,947,451; Issued May 24, 2011.
- **Schrodi SJ**, Begovich AB; US Patent 7,863,021; Issued January 4, 2011.
- Begovich AB, Carlton VEH, **Schrodi SJ**, Alexander HC. US Patent 7,833,706; Issued November 16, 2010.

INTELLECTUAL PROPERTY
US Patent Applications

- **Schrodi S**, Li Y. US Patent Application 20180171407; Original Filing: Jul 2, 2008; Current Filing: June 21, 2018.
- **Schrodi SJ**, Begovich A. US Patent Application 20170145503; Original Filing: Sep 5, 2007; Current Filing: May 25, 2017.
- Cargill M, Begovich AB, Carlton V, **Schrodi SJ**, Alexander HC. US Patent Application 20170029889; Original Filing: Nov 13, 2003; Current Filing: Feb 2, 2017.
- Begovich A, Beasley E, Cargill M, **Schrodi S**. US Patent Application 20170022564; Original Filing: Sep 11, 2006; Current Filing: Jan 26, 2017.
- Li Y, **Schrodi S**, Begovich A, Chang M, Cargill M. US Patent Application 20160244836; Original Filing: Nov 30, 2007; Current Filing: Aug 30, 2016.
- **Schrodi S**, Li Y. US Patent Application 20160222450; Original Filing: Jul 2, 2008; Current Filing: Aug 4, 2016.
- Begovich A, Beasley E, Cargill M, **Schrodi S**. US Patent Application 20150259744; Original Filing: Sep 11, 2006; Current Filing: Sep 17, 2015.

- Cargill M, Begovich AB, Carlton V, **Schrodi SJ**, Alexander HC. US Patent Application 20140234291; Original Filing: Nov 13, 2003; Current Filing: Aug 21, 2014.
- **Schrodi S**, Li Y. US Patent Application 20140127213; Original Filing: Jul 2, 2008; Current Filing: May 8, 2014.
- **Schrodi SJ**, Begovich AB. US Patent Application 20130315894; Original Filing: Sep 5, 2007; Current Filing: Nov 28, 2013.
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- Begovich A, Beasley E, Cargill M, **Schrodi S**. US Patent Application 20120010274; Original Filing: Sep 11, 2006; Current Filing: Jun 12, 2012.
- **Schrodi SJ**, Begovich AB. US Patent Application 20110293626; Original Filing: Sep 5, 2007; Current Filing: Dec 1, 2011.
- Cargill M, Begovich AB, Carlton VEH, **Schrodi SJ**, Alexander HC. US Patent Application 20100215645; Original Filing: Nov 13, 2003; Current Filing: Aug 26, 2010.
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INVITED PRESENTATIONS

- **Schrodi SJ.** The Discovery of Rheumatoid Arthritis Susceptibility Genes. Shanghai Academy of Chinese Medical Sciences, GuangHua Integrative Medicine Hospital, Shanghai, China. 2018.
- **Schrodi SJ.** A Survey of Four Disease Genetics Investigations using the Personalized Medicine Research Project. Computation & Informatics in Biology & Medicine Seminar, UW-Madison, Madison, WI. 2017.
- **Schrodi SJ.** Medical Interventions Program. Keynote Speaker. 2017.
- **Schrodi SJ.** Research in Genetic Models: Applied Probability in Population Genetics and Human Genetics. Mathematics, Statistics and Computer Science Colloquium, Marquette University. 2016, April 25; Milwaukee, Wisconsin, USA.
- **Schrodi SJ.** Genetic Architecture of Human Complex Disease and Genetic-Based Predictive Models. UW-Madison Animal Genetics Graduate Seminar; 2014 November 11; Madison, Wisconsin, United States.
- **Schrodi SJ.** Antibody Screen in Multiple Sclerosis. Antigen Discovery; 2014; Irvine, CA, USA.
- **Schrodi SJ.** Interpretation of Data. Infectious Disease Working Group, Marshfield Clinic; 2014; Marshfield, WI, USA.
- **Schrodi SJ.** Human Genetics, the Genomics of Cytokine Expression, and PTPN22 Pleiotropy. Infectious Disease Working Group, Marshfield Clinic; 2013; Marshfield, WI, USA.
- **Schrodi SJ.** Clinical Genomics: Genetic Prediction of Pharmacological Response to Lercanidipine and Risk of Hypertension. Critical Assessment of Massive Data Analysis; 2012; Long Beach, CA, USA.
- **Schrodi SJ.** Mapping Common Disease Genes through Association: Theory and Experiment. Oregon Health & Science University; 2010; Portland, OR, USA.
- **Schrodi SJ.** Mapping Common Disease Genes through Association: Theory and Experiment. Virginia Institute for Psychiatric and Behavioral Genetics; 2010; Richmond, VA, USA.
- **Schrodi SJ.** Structural Variation and Pharmacogenetics of Idiopathic Short Stature. Ipsen; 2010; Paris, France.
- **Schrodi SJ.** Mapping Autoimmunity Genes: Experiment, Theory and Statistical Methods. Center for Human Genetics Research, Vanderbilt University; 2009; Nashville, TN, USA.
- **Schrodi SJ.** Mapping Common Disease Genes through Association: Theory and Experiment. Institute of Human Genetics/Department of Neurology; UCSF; 2009; San Francisco, CA, USA.
- **Schrodi SJ.** Trait Prediction using Multi-Locus Information: Psoriasis as a Model for Complex Disease Prognosis. International Society of Genetic Epidemiology; 2009; HI, USA.
- **Schrodi SJ.** Mapping Common Disease Genes through Association: Theory and Experiment. BSRI, UCSF; 2008; San Francisco, CA, United States.
- **Schrodi SJ.** Large-Scale Association Mapping and Genetic-Based Prognosis. Washington University, Statistical Genomics Group; 2007; St. Louis, MO, USA.

- **Schrodi SJ.** Induction Ideas for Large-Scale Genetic Analyses and Fine-Scale Mapping of PTPN22. Ernest Gallo Clinic and Research Center, UCSF; 2005; Emeryville, CA, USA.
- **Schrodi SJ.** Discovery and Utility of Disease Genes: Results and Lessons from Association Mapping Studies. UCSF Frontiers in Neurology and Neuroscience, Keynote Speaker; 2005; San Francisco, CA, USA.
- **Schrodi SJ.** Using Population Genetics to Inform Linkage Disequilibrium Studies. Haplotype Summit I; 2002; Foster City, CA, USA.
- **Schrodi SJ.** Transition Properties of Diffusion Processes. Mathematics Series on Diffusion Equations; 2000; Irvine, CA, USA.
- **Schrodi SJ.** Mathematical Models of Self-Replicating Systems. Skaggs Institute of Chemical Biology; 2000; San Diego, CA, USA.
- **Schrodi SJ.** Testing Hypotheses with Expression Data: Part II. Incyte Genomics Conference; 2000; CA, USA.
- **Schrodi SJ.** Testing Hypotheses with Expression Data: Part I. Incyte Genomics Conference; 2000; CA, USA.
- **Schrodi SJ.** Inference of Biochemical Networks from Expression Data. Yeast Genomics Conference; 2000; Irvine, CA, USA.
- **Schrodi SJ.** The Mathematics of Biological Systems. Mathematics Lecture Series; 1999; Irvine, CA, USA.
- **Schrodi SJ.** Discerning Temporal Effects of the Dispersion Index. Molecular Biology and Evolution Society Meeting on Molecular Evolution; 1998; Vancouver, British Columbia, Canada.
- **Schrodi SJ.** Haploid Models. Pacific Institute of Mathematics; 1998; Vancouver, British Columbia, Canada.
- **Schrodi SJ.** Increasing Dispersion Index in Mammals. Integrative Biology Group, UCB; 1996; Berkeley, CA, USA.
- **Schrodi SJ**. A Method for the in vitro evolution of proteins. Department of Molecular Biology and Biochemistry, UC Irvine; 1995; Irvine, CA, USA.
- **Schrodi SJ**. Influence of Electrostatic Charges on the Movement of Dust by Wind. NASA Ames Research Center; 1993; Moffett Field, CA, USA.

SERVICE

- Associate Editor
  Frontiers in Genetics, Statistical Genetics and Methodology (2015-Present)
- Member
  MCRI Director, Office of Research Support Services, Search Committee (2017-Present)
- Member
  MCRF Seminar Series Committee (2013-Present)
- Member
  Wisconsin Genomics Initiative (2010-Present)
- Reviewer
  Clinician Scientist Collaborative Research Awards 2018
- Reviewer
  ICTR Grant Review Panel (2014-2015)
- Member
  MCRF Research Compliance Committee (2013-2015)
- Reviewer
  Multiple Sclerosis Research Australia Grants Review 2014
- Advisor
  MCRF Summer Student 2014
- Member
  MCRF Strategic Planning Steering Committee 2014
- Member

Sponsored Programs Process Improvement Committee 2014

- Scientific Mentor
  Biomolecular Modeling SMART Team and Biochemistry, Marshfield High School (2012-2014)
- External Reviewer
  Tenure Application Review, Pediatrics Department, UW-Madison 2013
- Member
  MCRF Associate Director Search Committee 2013
- Reviewer
  Steve J. Miller Endowment Committee 2013
- Advisor
  Postdoctoral Fellow 2012, 2017-Pres
- Scientific Committee Member
  Critical Assessment of Massive Data Analysis 2012
- Statistical Genetics Consultant
  Lineagen Corporation, Salt Lake City, UT (2009-2010)
- Member
  Scientific Advisory Board, DNA Sciences (2000-2001)
- *Ad hoc* Reviewer (1999-Present)
  New England Journal of Medicine
  Nature
  Journal of Investigative Dermatology
  Science Advances
  Genes and Immunity
  American Naturalist
  American Journal of Human Genetics
  Genetics
  Statistical Applications in Genetics and Molecular Biology
  Arthritis & Rheumatism
  Annals of Neurology
  Computational Statistics and Data Analysis
  Molecular Psychiatry
  U.S. Geological Survey
  Journal of Pediatric Genetics
  Human Immunology
  Genetics in Medicine
  BMC Genomics
  Diabetologia

PROFESSIONAL MEMBERSHIP

- American Society of Human Genetics
- International Society of Bayesian Analysis
- American Association for the Advancement of Science

FUNDING
Ongoing Research

- UL1 TR000427 Drezner (PI) 06/01/2015 -- 05/31/2019
  NIH-NCATS/UW-Institute for Clinical & Translational Research
  Role: Investigator

- MCRI Research Award Schrodi (PI) 07/06/2018 – 04/30/2020
  Detecting Shared Chromosomal Regions and Compound Heterozygous Effects for Diseases
  Role: Principal Investigator

- 1RO1GM114128 Hebbring (PI) 09/01/2014 – 08/31/2019

PheWAS of Loss-of-Function Variants
Role: Co-Investigator

- 5RO1MH097464-03 Lainhart (PI) 04/01/2013 – 07/31/2019
  The Biological Basis of Variations in Brain Structure and Function in Autism
  Role: Site Principal Investigator

FUNDING
Completed Research

- Clinical Scientist Development Award Shelef (PI) 07/01/2017 – 06/30/2018
  Doris Duke Charitable Foundation
  Role: Consultant

- Second Genome Contract Schrodi (PI) 08/09/2015 – 08/09/2017
  Inflammasome Host and Microbiome Genetics
  Role: Principal Investigator

- Rheumatology Research Foundation Smith (PI) 07/01/2013 – 12/31/2015
  Analysis of Causal Variants in the IL-23/IL-17 Pathway Genes in Axial Spondyloarthritis
  Role: Site Principal Investigator

- Metanomics Health Schrodi (PI) 08/01/2012 – 07/13/2016
  Type 2 Diabetes Prediction
  Role: Principal Investigator

- UL1 TR000427 Pilot Grant Award Rose/Shukla (PI) 06/01/2015 – 05/31/2016
  NIH-NCATS/UW-Institute for Clinical & Translational Research
  Biomarkers of Staphylococcus aureus bacteremia
  Role: Investigator

  5R01HL089655-04 Broeckel (PI) 08/01/2012 – 07/31/2014
  NIH-National Heart, Lung and Blood Institute
  Genome Wide Association of Coronary Artery Disease and Related Risk Factors
  Role: Site Principal Investigator

- Aviir, Inc. Cross/Schrodi (PI) 03/01/2011 – 09/22/2015
  Identification and Validation of Protein Biomarkers for Cardiovascular Disease
  Role: Principal Investigator

- UL1 TR00427 Pilot Grant Award Schrodi (PI) 06/01/2012 – 05/31/2013
  NIH-NCATS/UW-Institute for Clinical & Translational Research
  Cytokine Genomics
  Role: T1 Pilot Grant Principal Investigator

- 11-8668 Schrodi (PI) 04/01/2011 – 03/31/2013
  University of Wisconsin-Madison
  Genetics of the Innate Immune Response of the Infant as a Potential Biomarker for Premature Birth
  Role: Site Principal Investigator