

Karin S. Dorman

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or Department of Genetics, Development & Cell Biology

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Education

- 2001 Ph.D., UCLA, Los Angeles, CA, Biomathematics
1999 Ph.D. (Qualifying Year), 1999, UCLA, Los Angeles, CA, Biomathematics
1994 B.S., Indiana University, Bloomington, IN, Biology with honors
1994 B.S., Indiana University, Bloomington, IN, Mathematics with honors

Employment

- 2007–today Associate Professor, Departments of Statistics and Genetics, Development & Cell Biology, Iowa State University
2001–2007 Assistant Professor, Departments of Statistics and Genetics, Development & Cell Biology, Iowa State University
2001 Instructor, Departments of Statistics and Zoology/Genetics, Iowa State University

Teaching

(times, last)

- (1, Sp09) STAT 341 Introduction to Theory and Probability of Statistics I, ISU
(2, F09) STAT 430 Empirical Methods for Computer Science Research, ISU
(2, F05) STAT 432 Applied Probability Models, ISU
(4, F08) STAT/GDCB (dual-listed) 536 Genetic Statistics, ISU
(2, Sp07) STAT/GDCB (dual-listed) 537 Statistics for Molecular Genetics, ISU
'03-'09 NIH-NSF BBSI Summer Inst. in Bioinformatics and Comput. Biol., ISU

Advisees

Current: *Ph.D. (Co-)Major (3):* W.-C. Chen (2006), C. Christian (2008), M.L. Rajaram (2005), A. Sethuraman (2008), Y. Zheng (2001); *M.S. (2):* D.C. Blythe (2008), Y. Huang (2008)

Previous: *Postdoc (1):* M. de Macedo (2003-2005; postdoc, ISU), *Ph.D. (Co-)Major (2):* G.M. Dancik (2003-2008; faculty, Northwestern State U., LA), F. Fang (2001-2006; postdoc, Rockefeller U.); *M.S. (7):* M. Beard (2007-2008; Ph.D., Purdue U.) X. Gao (2005-2006; postdoc, Indiana U.), C. Guo (2003-2004; Amgen), L. Hughes (2002-2004; unemployed), Z. Frederickson (2005-2006; Mayo Clinic, MN), M.-Y. Yum (2004-2005; Ph.D., ISU), H. Zhou (2002-2004, postdoc, UCLA); *Undergrad. (18):* J. Aidoo (2009; M.S., Wright State U.), A. Beck (2009; B.S., Central College, IA), R. Culver (2007; Ph.D., ISU), N. Gotman (2003; M.S., U. Iowa), A. Halvorsen (2003, Ph.D., ISU), E. Hartley (2009), L. Ho (2002,

PharmD, UCSF), K. James (2004), A. Lee (2007, B.S., U. Northern Iowa), L. Lippincott (2004), C. Morgan (2008), D. Mooney (2004, TIGR), B. Mulaosmanovic (2009, B.S., ISU), M. Rischmiller (2003), S. Spencer (2007, M.S., U. Iowa), M. Wallace (2009, B.S., ISU), S. Wilkerson (2008), J. Wynn (2008)

Grants – National

- 2/08–1/13 Carpenter, NIH, Strategies of Lentivirus Persistence, \$1,681,384.
7/04–6/07 Dorman, NIH-NIGMS, GM068955 – Statistical, Computational and Genetic Analysis of HIV Recombination, \$972,702.
9/07–8/10 Jernigan, NIH-NSF, ECC-0608769 – BBSI Computational and Systems Biology Summer Institute at Iowa State University [renewal], \$449,999.
6/03–8/07 Brendel, NIH-NSF, ECC-00234102 – BBSI Summer Institute in Bioinformatics and Computational Biology, \$645,000.
7/02–6/04 Carpenter, NIH, CA97936 – Multilocus Selection of Lentivirus Variants, \$289,700.

Grants – Local

- 8/08–6/09 Dorman & Maitra, CIAG Research Support Grant – Phyloclustering - Novel Methods to Identify Genetic Population Structure in Fast-Evolving Pathogens, \$24,451.
7/07–6/09 Dorman, CIAG Research Support Grant – Agent Based Model of Treg Function in Leishmania Disease, \$24,530.
1/06–12/06 Su, Provost's Office – Special Interdisciplinary Seminar on Mathematical Biology, \$8,000.
12/05–6/06 Hogben, Women's Enrichment Fund – Women in Mathematical Sciences Distinguished Lecture Series, \$2,000.
10/04–9/07 Dorman, CIAG Research Support Program – Building a Comprehensive Model of Pathogen-Host Interactions During Persistent Infections, \$44,000.
1/02–6/02 Dorman, Faculty Development Grant, \$17,400.
7/02–6/03 Carpenter, Healthy Livestock Initiative Competitive Grants Program – Genetic and Computational Analysis of Virus Evolution, \$10,000.
7/01–6/02 Carpenter, Healthy Livestock Initiative Competitive Grants Program – Genetic and Computational Analysis of Virus Evolution, \$20,000.

Honors & Awards

- 2007 LAS Award for Early Achievement in Research, ISU, Ames, IA
2000 Dissertation Year Fellowship, UCLA, Los Angeles, CA
1994 NSF Graduate Fellowship, UCLA, Los Angeles, CA

Refereed Publications

38. J.A. Farfan-Ale, M.A. Loroo-Pino, J.E. Garcia-Rejon, V. Soto, M. Lin, M. Staley, **K.S. Dorman**, L.C. Bartholomay, E. Hovav, B.J. Blitvich. (2009) Detection of flaviviruses

and orthobunyaviruses in mosquitoes in the Yucatan Peninsula of Mexico in 2008. *Vector-Borne and Zoonotic Diseases*. Accepted.

37. X. Yang, S. Aluru, **K.S. Dorman**. (2009) Improved Error Modeling and Detection for High-Throughput Short Reads. Fourteenth International Conference on Research in Computational Molecular Biology (RECOMB). Submitted.
36. M.L. Rajaram, **K.S. Dorman**. (2009) Rapid genotyping for HIV using supervised learning tools. *Proceedings of the 2009 International Conference on Bioinformatics Computational Biology (BIOCOMP2009)*, Las Vegas, Nevada, USA, July 13-16, 2009. Accepted.
35. G.M. Dancik, D.E. Jones, **K.S. Dorman**. (2009) Parameter estimation and sensitivity analysis in an agent-based model of *Leishmania major* infection. *Journal of Theoretical Biology*. Accepted.
34. B.J. Blitvich, M. Lin, **K.S. Dorman**, V. Soto, E. Hovav, B.J. Tucker, M. Staley, K.B. Platt, L.C. Bartholomay. (2009) Genomic sequence and phylogenetic analysis of *Culex flavivirus*, an insect-specific flavivirus, isolated from *Culex pipiens* in Iowa. *Journal of Medical Entomology*. **46**(4):934–41.
33. J. A. Farfan-Ale, M. A. Loroño-Pino, J. E. Garcia-Rejon, E. Hovav, A. M. Powers, M. Lin, **K. S. Dorman**, K. B. Platt, L. C. Bartholomay, V. Soto, B. J. Beaty, R. S. Lanciotti, B. J. Blitvich. (2009) Detection of RNA from a novel West Nile-like virus and high prevalence of an insect-specific flavivirus in mosquitoes in the Yucatan Peninsula of Mexico. *American Journal of Tropical Medicine & Hygiene*. **80**(1):85-95.
32. E.W. Bloomquist, **K.S. Dorman**, M.A. Suchard. (2009) StepBrothers: inferring spatially shared ancestries among recombinant viral sequences. *Biostatistics*. **10**:106-120.
31. G.M. Dancik, **K.S. Dorman**. (2008) *mleqp*: statistical analysis for computer models of biological systems using R. *Bioinformatics*. **24**:1966-1967.
30. B. Su, W. Zhou, **K.S. Dorman**, D.E. Jones. (2008) Mathematical modeling of immune response in tissues. *Computational and Mathematical Methods in Medicine*.
29. W.O. Sparks, **K.S. Dorman**, S. Liu, S. Carpenter. (2008) Selection on Rev during persistent equine infectious anemia virus infection. *Journal of General Virology*. **89**:1043-1048.
28. M.L. Rajaram, V.N. Minin, M.A. Suchard, **K.S. Dorman**. (2007) Hot and Cold: Spatial Fluctuation in HIV-1 Recombination Rates. *Proceedings of the IEEE 7th Conference on Bioinformatics and Bioengineering (BIBE2007)*.

27. M.E. Sparks, V. Brendel, **K.S. Dorman**. (2007) Markov model variants for appraisal of coding potential in plant DNA. *Lecture Notes in Computer Science*. 4463:394–405.
26. V. N. Minin, **K. S. Dorman**, F. Fang, M. A. Suchard. (2007) Spatially smoothing change-point processes for phylogenetic mapping of recombination hot-spots. *Genetics*. **175**:1773–1785.
25. K. A. Ahmed, V. K. Saxena, M. Saxena, A. Ara, A. B. Pramod, M. L. Rajaram, **K. S. Dorman**, S. Majumdar, T. J. Rasool. (2007) Molecular cloning and sequencing of MHC class II beta 1 domain of turkey reveals high sequence identity with chicken. *International Journal of Immunogenetics*. **34**(2):97–105.
24. F. Fang, J. Ding, V. N. Minin, M. A. Suchard, **K. S. Dorman**. (2007) cBrother: Relaxing parental tree assumptions for Bayesian recombination detection. *Bioinformatics*. **23**(4):507–508.
23. **K. S. Dorman**. (2007) Identifying dramatic selection shifts in phylogenetic trees. *BMC Evolutionary Biology*. **7**(suppl. 1):S10.
22. G. Dancik, **K. S. Dorman**, D. E. Jones. (2006) An agent-based model for Leishmania infection. *Proceedings of the International Conference on Complex Systems (ICCS2006)*.
21. V. N. Minin, **K. S. Dorman**, F. Fang, M. A. Suchard. (2005) Dual multiple change-point model leads to more accurate recombination detection. *Bioinformatics*. **21**(13): 3034–3042.
20. J. D. Wolt, Y. Y. Shyy, P. Christensen, **K. S. Dorman**, M. Misra. (2004) Quantitative exposure assessment for confinement of maize biogenic systems. *Environmental Biosafety Research*. **3**(4): 183–196.
19. **K. S. Dorman**, K. Lange, J. S. Sinsheimer. (2004) In the garden of branching processes. *SIAM Review*. **46**(2): 202–229.
18. P. Baccam, R. J. Thompson, Y. Li, W. O. Sparks, M. Belshan, **K. S. Dorman**, Y. Wannemuehler, J. L. Oaks, J. L. Cornette, S. Carpenter. (2003) Subpopulations of equine infectious anemia virus Rev coexist in vivo and differ in phenotype. *Journal of Virology*. **77**(22): 12122–31.
17. M. A. Suchard, R. E. Weiss, J. S. Sinsheimer, **K. S. Dorman**, M. Patel, and E. R. B. McCabe. (2003) Evolutionary similarity among genes. *Journal of the American Statistical Association*. **98**: 653–662.
16. J. S. Sinsheimer, M. A. Suchard, **K. S. Dorman**, F. Fang, R. E. Weiss (2003) Are you my mother? Bayesian phylogenetic inference of recombination among putative parental strains. *Applied Bioinformatics*. **2**(3): 131–144.

15. M. A. Suchard, R. E. Weiss, **K. S. Dorman**, J. S. Sinsheimer. (2003) Inferring spatial phylogenetic variation along nucleotide sequences: a multiple change-point model. *Journal of the American Statistical Association*. **98**: 427–437.
14. M. A. Suchard, R. E. Weiss, **K. S. Dorman**, J. S. Sinsheimer. (2002) Oh brother where art thou? A Bayes factor test for recombination with uncertain heritage. *Systematic Biology*. **51**(5): 1–14.
13. **K. S. Dorman**, A. H. Kaplan, J. S. Sinsheimer. (2002) Bootstrap confidence levels for HIV-1 recombination. *Journal of Molecular Evolution*. **54**(2): 200–209.
12. M. Patel, **K. S. Dorman**, Y.-H. Zhang, B.-L. Huang, A. P. Arnold, J. S. Sinsheimer, E. B. Vilain, E. R. B. McCabe. (2001) Primate DAX1, SRY, and SOX9: evolutionary stratification of sex-determination pathway. *American Journal of Human Genetics*. **68**: 275–280.
11. **K. S. Dorman**, A. H. Kaplan, K. Lange, J. S. Sinsheimer (2000) Mutation takes no vacation: can structured treatment interruptions increase the risk of drug-resistant HIV-1? *Journal of Acquired Immune Deficiency Syndrome*. **25**: 398–402.
10. C. Perez, P. Vial, **K. S. Dorman**, G. Wang, G. Wang, K. Abarca, J. S. Sinsheimer, A. H. Kaplan. (1999) Epidemiología molecular del virus de inmunodeficiencia humana tipo 1 en Santiago, Chile. *Revista Médica de Chile*. **127**: 1294–1304.
9. W. J. Lech, G. Wang, Y. Yang, Y. Chee, **K. Dorman**, D. McCrae, L. C. Lazzeroni, J. W. Erickson, J. S. Sinsheimer, A. H. Kaplan. (1996) In vivo sequence diversity of the protease of the Human Immunodeficiency Virus type 1: presence of protease inhibitor resistant variants in untreated subjects. *Journal of Virology*. **70**: 2038–2043.
8. Y. L. Yang, G. C. Wang, **K. S. Dorman**, A. H. Kaplan. (1996) Long polymerase chain reaction amplification of heterogeneous HIV-1 templates produces recombination at relatively high frequency. *AIDS Research and Human Retroviruses*. **12**: 303–306.
7. **K. S. Dorman**. 2006. Trees (Evolutionary). In *The Wiley Encyclopedia of Biomedical Engineering*. Ed. M. Akay. Hoboken, NJ: John Wiley & Sons.
6. H. Zhou, **K. S. Dorman**. 2005. A branching process model of drug resistant HIV. In *Deterministic and Stochastic Models for AIDS Epidemics and HIV Infections with Interventions*. Eds. W.-Y. Tan, H. Wu. London: World Scientific Publishing Co.
5. F. Fang, M. A. Suchard, V. N. Minin, **K. S. Dorman**. (2005) A Bayesian phylogenetic model for testing recombination event. *Proceedings of the Joint Statistical Meetings*, Section on Bayesian Statistical Science.
4. **K. S. Dorman**, X. Gu. (2005) Bayesian inference for functional divergence. *Proceedings of the Joint Statistical Meetings*, Section on Bayesian Statistical Science.

3. V. N. Minin, **K. S. Dorman**, M. A. Suchard. (2004) Bayesian recombination identification: new models for incorporating prior information. *Proceedings of the Joint Statistical Meetings*, Section on Bayesian Statistical Science.
2. M. A. Suchard, R. E. Weiss, **K. S. Dorman**, M. Patel, E. R. B McCabe, J. S. Sinsheimer. (2000) Evolutionary similarity among genes when data are sparse. *Proceedings of the Joint Statistical Meetings*, Section on Bayesian Statistical Science. pp. 92-97.
1. **K. S. Dorman**, A. H. Kaplan, J. S. Sinsheimer (1999) Estimating confidence in the inference of HIV recombination. *Proceedings of the Joint Statistical Meetings*.

Book Chapters

2. **K. S. Dorman**. 2006. Trees (Evolutionary). In *The Wiley Encyclopedia of Biomedical Engineering*. Ed. M. Akay. Hoboken, NJ: John Wiley & Sons.
1. H. Zhou, **K. S. Dorman**. 2005. A branching process model of drug resistant HIV. In *Deterministic and Stochastic Models for AIDS Epidemics and HIV Infections with Interventions*. Eds. W.-Y. Tan, H. Wu. London: World Scientific Publishing Co.

Proceedings

5. F. Fang, M. A. Suchard, V. N. Minin, **K. S. Dorman**. (2005) A Bayesian phylogenetic model for testing recombination event. *Proceedings of the Joint Statistical Meetings*, Section on Bayesian Statistical Science.
4. **K. S. Dorman**, X. Gu. (2005) Bayesian inference for functional divergence. *Proceedings of the Joint Statistical Meetings*, Section on Bayesian Statistical Science.
3. V. N. Minin, **K. S. Dorman**, M. A. Suchard. (2004) Bayesian recombination identification: new models for incorporating prior information. *Proceedings of the Joint Statistical Meetings*, Section on Bayesian Statistical Science.
2. M. A. Suchard, R. E. Weiss, **K. S. Dorman**, M. Patel, E. R. B McCabe, J. S. Sinsheimer. (2000) Evolutionary similarity among genes when data are sparse. *Proceedings of the Joint Statistical Meetings*, Section on Bayesian Statistical Science. pp. 92-97.
1. **K. S. Dorman**, A. H. Kaplan, J. S. Sinsheimer (1999) Estimating confidence in the inference of HIV recombination. *Proceedings of the Joint Statistical Meetings*.

Invited Presentations

5. W.-C. Chen, **K. S. Dorman** (2009) Phyloclustering: new phylogenetic methods for fast-evolving quasispecies. *Joint Statistical Meetings*, Section on Bayesian Statistical Science. Washington D.C..
4. W.-C. Chen, **K. S. Dorman**, R. Maitra. (2009) Phyloclustering: model-based inference of population structure from genetic sequence data. *ISU 75th Statistical Laboratory Conference*. Ames, IA.
3. S. Carpenter, C. Casovant, **K. S. Dorman**, V. Minin, M. L. Rajaram, M. A. Suchard (2007) Survey of recombination in the HIV genome to identify hotspots and associations with sequence patterns. *Joint Statistical Meetings*, Computationally Intensive Methods in AIDS Research. Salt Lake City, UT.
2. **K. S. Dorman**, J. S. Sinsheimer, K. Lange. (July, 2005) Numerical methods for branching process models. The European Conference on Mathematical and Theoretical Biology, Dresden, Germany.
1. **K. S. Dorman**. (July, 2004) Numerical methods for branching processes with applications to HIV drug resistance. Society for Mathematical Biology, Ann Arbor, MI.