

MARTIN ALVA HAMILTON, Professor Emeritus of Statistics

EDUCATION

Ph.D., Statistics, Stanford University, 1968.
 Fulbright Scholar, Biostatistics, University of Aberdeen, Scotland, 1963
 M.S., Statistics, University of Wyoming, 1962
 B.S., Statistics, University of Wyoming, 1961

EXPERIENCE

2005 – Present: Senior Statistician and CEO, Big Sky Statistical Analysts, LLC
 1970 – 2006: Montana State University - Bozeman
 Center for Biofilm Engineering (33%) 2003 – 2006; Adjunct Professor
 Department of Mathematical Sciences 1970 – 2002; Professor 1980 - 2002; Professor Emeritus since 2003.
 Center for Biofilm Engineering (Joint appt: 50%) 1991–Present; Acting Dir., briefly in 1991–92.
 WAMI Regional Medical Education Program (Joint appt: 10%) 1976–85, 90–91.
 Department of Microbiology (Joint appointment: 15%) 1983 – 1988.
 1978 – 1979: Visiting Scientist, Biometry Branch, National Institute for Environmental Health Sciences
 1968 – 1970: Staff Scientist, Mathematical Statistics and Applied Mathematics Section, Biometry Branch, National Cancer Institute
 1961– 1968: Teaching Assistant/NIH Trainee, University of Wyoming and Stanford University

AREAS OF EXPERTISE

Statistical methods for microbiology, biofilm science & technology, disinfectant efficacy evaluation, toxicology, epidemiology, and biological assay.
 Robust and distribution-free statistical inference.

PUBLICATIONS

Use of Statistical Modeling to Reassess the Performance Standard for the AOAC Use-dilution Methods (955.15 and 964.02). *Jour. AOAC International* In Press (2013) S. F. Tomasino, A.E. Parker, and M.A. Hamilton.
 A Statistical Model for Assessing Performance Standards for Quantitative and Semi-quantitative Disinfectant Test Methods. *Jour. AOAC International* In Press (2013) A.E. Parker, M.A. Hamilton, and S. F. Tomasino.
 Guidelines for the Statistical Analysis of a Collaborative Study of a Laboratory Method for Testing Disinfectant Product Performance. *Jour. AOAC International* 96(5):1138-1151 (2013) M.A. Hamilton, G.C. Hamilton, D. M. Goeres and A.E. Parker.
 Performance of the AOAC Use-dilution Method with Targeted Modifications: A Collaborative Study. *Jour. AOAC International* 95(6):1618-1628 (2012) S. Tomasino, A. Parker, M. Hamilton, G. Hamilton.
 Use of alternative carrier materials in AOAC Official Method 2008.05, efficacy of liquid sporicides against spores of *Bacillus subtilis* on a hard, nonporous surface, quantitative three-step method. *Jour. AOAC International* 93(1):p259-276 (2010) S. F. Tomasino, V. K. Rastogi, L. Wallace, L. S. Smith, M. A. Hamilton, and R. M. Pines.
 Checking the validity of the harvesting and disaggregating steps in laboratory tests of surface disinfectants, *Jour. AOAC International* 92(6):p1755-1762 (2009) M. Hamilton, K. Buckingham-Meyer, and D. Goeres.
 Improving the AOAC use-dilution method by the establishment of minimum log density values for test microbes on inoculated carriers *J AOAC International* 92(5):1531-1540 (2009) S. Tomasino, R. Pines, and M. Hamilton.
 A method for growing biofilm under low shear at the air liquid interface using the drip flow biofilm reactor, *Nature Protocols* 4(5):783-788 (2009) D. Goeres, M. Hamilton, N. Beck, K. Buckingham-Meyer, J. Hilyard, L. Loetterle, L. Lorenz, D. Walker, and P. Stewart.
 Resilience of planktonic and biofilm cultures to supercritical CO₂, *Journal of Supercritical Fluids* 47:318-325 (2008), A. C. Mitchell, A. J. Phillips, M. A. Hamilton, R. Gerlach, W. K. Hollis, J. P. Kaszuba, and A. B. Cunningham.

- Determining the Efficacy of Liquid Sporicides against Spores of *Bacillus subtilis* on a Hard Surface Using the Quantitative Three Step Method: Method Validation Study, *JAOAC International* 91:833-852. (2008) S. F. Tomasino, R. M. Pines, M. P. Cottrill, and M. A. Hamilton.
- Comparative evaluation of biofilm disinfectant efficacy tests, *J. Microbiol. Methods* 70:236-244 (2007), K. Buckingham-Meyer, D.M. Goeres and M.A. Hamilton.
- Comparative evaluation of two quantitative test methods for determining the efficacy of liquid sporicides on a hard surface: a pre-collaborative study, *JAOAC International* 90(2):456-464 (2007), S. F. Tomasino & M. A. Hamilton.
- Asiatic acid and corosolic acid enhance the susceptibility of *P. aeruginosa* biofilms to tobramycin, *Antimicrobial Agents and Chemotherapy*. 51(5):1813-1817 (2007), E. Garo, G.R. Eldridge, M.G. Goering, E.D. Pulcini, M.A. Hamilton, J.W. Costerton, and G.A. James.
- A laboratory hot tub model for disinfectant efficacy evaluation, *J. Microbiol. Methods* 68:184-192 (2007) D.M. Goeres, L.R. Loetterle, M.A. Hamilton.
- Modification of the AOAC sporicidal activity of disinfectants test (method 966.04): collaborative study, *JAOAC International* 89(5):1373-1397 (2006), S. F. Tomasino & M. A. Hamilton.
- A 3D model of antimicrobial action on biofilms, *Water Sci. Technol.* 52(7):143-148 (2005), S.M. Hunt, M.A. Hamilton, and P.S. Stewart.
- Statistical assessment of a laboratory method for growing biofilms, *Microbiology* 151: 757-762 (2005), D. G. Goeres, L. R. Loetterle, M. A. Hamilton, R. Murga, D. W. Kirby, and R. M. Donlan.
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- Comparison of fluorescent microscopy and solid phase cytometry for counting bacteria in water, *Applied and Environmental Microbiology* 70:9:5343-5348 (2004) J. T. Lisle, M. A. Hamilton, A. R. Willse, and G. A. McFeters.
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- A computer investigation of chemically mediated detachment in bacterial biofilms, *Microbiology* 149: 1155-1163 (2003), S. Hunt, M. Hamilton, J. Sears, G. Harkin, and J. Reno.
- A microtiter-plate screening method for biofilm disinfection and removal, *J. of Microbiological Methods*, 54:269-276 (2003), B. Pitts, M. Hamilton, N. Zilver, and P. Stewart.
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- How to optimize the drop plate method for enumerating bacteria, *Jour. of Microbiological Methods* 44:121-129 (2001) B. Herigstad, M. Hamilton, and J. Heersink.
- Apparent surface associated lag time in growth of primary biofilm cells, *Microbial Ecology* 40:8-15 (2000) A. Rice, M.A. Hamilton, and A.K. Camper.
- Estimating the antimicrobial log reduction: part 1. Quantitative assays, *Quantitative Microbiology*, 1:29-45 (1999), T.A. DeVries and M.A. Hamilton.
- Estimating the antimicrobial log reduction. Part 2. Presence/absence assays *Quantitative Microbiology*, 1:47-62 (1999), T.A. DeVries and M.A. Hamilton.
- Quantifying biofilm structure, *Water Science and Technology*, 39:71-76 (1999) Z. Lewandowski, D. Webb, M. Hamilton, and G. Harkin.
- Repeatability & reproducibility of germicide tests: a literature review, *Journal of the Association of Official Analytical Chemists, International*, 82:384-389 (1999), N. Tilt and M.A. Hamilton.
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- Estimating the power of the two-sample Wilcoxon test for location shift, *Biometrics*, 44:847-860 (1988), B. Collings & M. Hamilton.
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- Statistical analysis of the cladoceran reproductivity test, *Environmental Toxicology and Chemistry*, 5:205-212 (1986), M. Hamilton.
- Toxicity curve estimation: fitting a compartment model to median survival times, *Transactions of the Am. Fisheries Soc.*, 114:403-412 (1985), R. Chew & M. Hamilton
- Asymptotic distribution theory of statistical functionals: the compact derivative approach for robust estimators, *Annals of the Institute of Statistical Mathematics*, 37:a:109-129 (1985), with W. Esty, R. Gillette, M. Hamilton, and D. Taylor.
- Interval estimation of the density of organisms using a serial dilution experiment, *Biometrics*, 40:907-916 (1984), M. Loyer & M. Hamilton.
- Estimating proportionate changes in rates, *Am. Jour. Epidemiology*, 117:235-243 (1983), E. Smouse & M. Hamilton.
- Detection of interactive effects in carcinogenesis, *Biometrical Journal*, 24:483-491 (1982), M. Hamilton.
- Inference about the ED50 using the trimmed Spearman-Kärber procedure: a Monte Carlo investigation, *Communications in Statistics-Simulation and Computation*, 9:235-254 (1980), M. Hamilton.
- Statistical tests for recessive lethal carriers, *Mutation Research*, 64:269-278 (1979), M. Hamilton & J. Haseman.
- Choosing the parameter for a 2x2 table and a 2x2x2 table analysis, *Am. J. Epidemiology*, 109:362-375 (1979), M. Hamilton.
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- Variation in lodgepole pine: family response to stress induced by polyethylene glycol 6000, *Forest Science*, 24:523-526 (1978), D. Perry, J. Lotan, P. Hinz, & M. Hamilton.
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- Grouping to estimate the logistic response curve, *J. Statistical Computation and Simulation*, 5:279-301 (1977), M. Hamilton.
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- Statistical inference about injury and persistence of environmentally stressed bacteria, *Epidemiology and Infection* (formerly *J. Hygiene*), 74:149-155 (1975), M. Hamilton & G. Bissonnette.
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BOOKS & CHAPTERS

- The Biofilm Laboratory: Step-by-step protocols for experimental design, analysis, and data interpretation.* (2003) Cytergy:Bozeman, MT 104 pp. ISBN 0-9741802-0-3. Ed. by M. Hamilton, J. Heersink, K. Buckingham-Meyer, and D. Goeres.
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- Development of a standardized antibiofilm test, *Methods in Enzymology - Biofilms II*, R.J. Doyle, editor, 337:363-376 (2001) N. Zilver, M. Hamilton, D. Goeres, and J. Heersink
- Methods for measuring antimicrobial effects on biofilm bacteria: from laboratory to field, Chapt. 45 in *Methods in Enzymology - Biofilms*, R.J. Doyle, editor, 310:608-628 (1999) N. Zilver, M. Hamilton, B. Pitts, D. Goeres, D. Walker, P. Sturman, and J. Heersink.
- Evaluation of regulations for coliform contamination of drinking water, in the *Encyclopedia of Environmental Analysis and Remediation*, Ed. by R.A. Meyers, New York: Wiley, pp. 2789-2797 (1998) A. Camper and M. Hamilton.
- Bacterial colonization of surfaces in flowing systems: methods and analysis, in *Proceedings: Ultrapure Water Expo'94*, pp. 1-5, Littleton, CO: Tall Oaks Publ. (1994), with Camper, Johnson, Stoodley, Harkin, and Daly.
- Statistical methods for microbiology, in *Encyclopedia of Microbiology*, Vol. 4, pp. 75-85, J. Lederberg, ed., San Diego, CA: Academic Press (1992).
- Estimation of the typical lethal dose in acute toxicity studies, Chapter 4 p. 61-88 of *Statistics in Toxicology*, D. Krewski and C. A. Franklin, eds., New York: Gordon and Breach (1991).
- Robust analysis of quantal bioassay data, *Proceedings of the XIth International Biometric Conference*, pages 67-73, Institut National De La Recherche Agronomique, Versailles, France (1982), ISBN 2-85340-4 23-4.

TECHNICAL REPORTS & WORKING PAPERS:

- Survival of *Salmonella typhimurium* and *Escherichia coli* O157:H7 in model drinking water distribution systems, (2006) M. Warnecke, G. C. Hamilton, M. A. Hamilton, and A. K. Camper.
- Estimating kinetics parameters from microsensor measurements of substrate concentrations within a biofilm, (2004), E.J. Visser, M.A. Hamilton, Z. Lewandowski, J.B. Raquepas, and N. Tilt.
- Risk assessment at the U.S. Environmental Protection Agency: A review of selected documents, Statistical Center Technical Report #9-29-87 (1987), M. Hamilton .
- Invalidity of the Binomial Test Method for Calculating Confidence Interval Estimates of the LC50, Statistical Center Technical Report #6-10-83, Montana State University (1983), M. Hamilton .
- Statistical Methods for Analyzing Aquatic Toxicity Bioassay Experiments: A Survey, Statistical Center Technical Report #2-14-83, Montana State University (1983), M. Hamilton.
- Quantitative Methods for Describing Interactive Effects in Toxicology, Statistical Center Technical Report #1-6-80, Montana State University (1980), M. Hamilton & D. Hoel.
- MISMLE---A Computer Program for Calculating Maximum Likelihood Estimates when Some Data are Missing, Statistical Center Technical Report #1-6-76, Montana State University (1976), S. Hinkins & M. Hamilton.
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- Multiple Comparison Procedures, U.S. Forest Service Note RM-44 (1965), M. Hamilton.

PROFESSIONAL ASSOCIATION

Lifetime Member: American Statistical Association

AWARDS

Outstanding Research Award, College of Engineering, Montana State University, 2002.

Fellow, American Statistical Association, 2002.

Recognized as an author of one of the 10 most influential papers published in *Environmental Science and Technology* since the journal was founded by the American Chemical Society in 1967, *ES&T* 35:488A-494A, 2001.

Charles and Nora Wiley Faculty Award for Meritorious Research, Endowment and Alumni Foundation, Montana State University, 1984.