

GARY M. RAND, Ph.D.

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Department of Environmental Studies/SERC
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EXPERIENCE SUMMARY

Direct multidisciplinary environmental staffs, prepare budgets, long-range planning.

Develop ecotoxicology and ecological risk assessment programs.

Design and conduct of laboratory and field research programs for aquatic (freshwater, estuarine, marine)/terrestrial studies to assess the safety of chemical compounds including pesticides, metals, petroleum hydrocarbons, and polychlorinated biphenyls to the environment.

Prepare ecological risk assessments for regulatory submissions.

Natural resource damage assessments for hazardous waste sites.

Coordinate and direct activities related to water pollution, hazardous waste sites/groundwater/soil contamination, effluent (industrial/municipal wastewater) and sediment quality.

Knowledge of CERCLA/RCRA, MPRSA, CZMA, CWA and NPDES program, biological/toxicity techniques and chemical-specific analyses to assess effluent discharges including procedures to conduct studies to determine cause(s) of toxicity (TIEs) and develop remediation strategies (TRES).

Knowledge of environmental regulatory requirements (FDA, CWA, FIFRA, TSCA, EU) applicable to ecotoxicological activity and development of compounds for U.S. and international registration.

Toxicology support of environmental litigation.

Liaison with trade associations, agrochemical and pharmaceutical industries, U.S. and international regulatory agencies.

Provide counsel in environmental risk analysis to industry/regulatory agencies in U.S. and in Europe.

Senior editor of book series in ecotoxicology/environmental chemistry.

PROFESSIONAL BACKGROUND

ASSISTANT to FULL PROFESSOR, Department of Environmental Studies, Southeast Environmental Research Center (SERC), Florida International University. N. Miami, FL. August 1996 to Present.

Director of ecotoxicology and ecological risk assessment laboratory. Designed and constructed new state-of-the-art ecotoxicology laboratory building on Biscayne Bay. Conducts research on: acute and chronic effects of pesticides, metals, PAHs, PCBs and other foreign chemicals on freshwater, estuarine, marine, wetland and terrestrial species; effects of wastewaters and contaminated soils/sediments and identification of toxics (toxicity identification evaluations) and appropriate pollution remediation strategies (toxicity reduction evaluations). Prepares aquatic probabilistic ecological risk assessments to define potential for ecological effects at the community, population and ecosystem levels and determining impact of land use changes on water/sediment quality. Present research on ecosystems in South Florida from the St. Lucie River watershed to the Florida Keys including Everglades (e.g., Florida Bay), and Biscayne National Parks (e.g., Biscayne Bay) and Big Cypress National Preserve. Present aquatic risk assessments in C-111 canal and in South Biscayne Bay and Northeast Florida Bay.

Teach undergraduate courses (3 credits each): Introduction to Environmental Sciences, Environmental Resources and Pollution, Water Resources and Water Quality Laboratory. Teach graduate courses (3 credits each): Environmental Resources Management, Ecotoxicology, Ecological Risk Assessment. Designed curricula for graduate courses in ecotoxicology and risk assessment.

Member of Graduate Faculty with Dissertation Advisor Status. Chair M.S./Ph.D. committees. Support graduate students, technicians and post-doctoral research associates.

SENIOR SCIENTIST & DIRECTOR, ECOTOXICOLOGY, Ecological Services Inc. N. Palm Beach, FL. November 1994 to July 1996.

Provide counsel to agrochemical industry and regulatory agencies on the fate and effects of chemicals in aquatic and terrestrial ecosystems. Prepare predictive and retrospective ecological risk assessments to support regulatory requirements for major Federal (e.g., CERCLA/SARA, CWA, FIFRA) and international statutes. Conduct field studies in freshwater, brackish, marine, terrestrial and wetland ecosystems to identify biological impact and injury and develops strategies for remedial actions when necessary for point and non-point sources of pollution. Technical support in toxic tort litigation involving potential impact of foreign chemicals to aquatic organisms and wildlife. Administratively responsible for managing staff, budgets and planning.

ADJUNCT PROFESSOR, Nova Southeastern University, Oceanographic Center
- September 1994 to August 1999.

Teach graduate courses (3 credits each)

- Fundamentals of Aquatic Ecotoxicology (December 1994, 1995, 1996, 1999)
- Biological Effects and Risks of Chemicals in the Aquatic Environment (April 1995, September 1996)
- Biostatistics (June 1996, 1997)

Developed curricula for above three courses.

Chair/member of M.S.committees (2)

DIRECTOR/VICE PRESIDENT, Toxikon Environmental Sciences. Jupiter, FL.
June 1989 to November 1994.

Designed and developed start-up environmental toxicology contract research company to provide services for industry and regulatory agencies. Administratively responsible for a laboratory and field station and management of staff of approximately thirty-five to forty professionals (M.S., Ph.D.) of ecologists, aquatic toxicologists, modelers and environmental chemists with annual budget of 2-3 million dollars. Designed and developed state-of-the-art aquatic toxicology laboratory with static and flow-through systems and microcosm field station to conduct outdoor simulated field studies to assess stress to organisms in freshwater, estuarine and marine ecosystems.

Conducts laboratory and field (microcosm, pond) studies for the chemical, petroleum and pharmaceutical industries and state and federal regulatory agencies to determine the environmental fate of chemicals (including pesticides, PAHs) and their toxicological effects on freshwater, estuarine, and marine ecosystems. Laboratory studies evaluated the acute and chronic effects of chemicals on development, growth, reproduction and survival of aquatic

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organisms. Field studies evaluated chemical impact on the structure and function of aquatic communities and the distribution and persistence of chemicals in different environmental matrices. Responsible for experimental design of special laboratory and field aquatic programs and protocols on sediment bound lipophilic chemicals, and to evaluate behavioral and physiological effects. Provides counsel and prepares

regulatory submissions for industry on the potential hazards associated with chemical exposure in the environment regarding both biological effects to aquatic and avian/wildlife species and the fate of chemicals in water and sediment (and soil) systems. Conducts site investigations and prepares ecological risk assessments under FIFRA and at Superfund sites to describe quantitatively and qualitatively the nature and magnitude of potential risks to the environment as a result of exposure to pesticides and metals. Fate and effects models used in risk assessments. Interacts with state, federal and international regulatory agencies on ecotoxicology issues and the development and registration of agrochemicals including drugs.

Member of Ph.D. committee in Ecotoxicology - University of Miami, Rosentiel School of Marine and Atmospheric Science - 1994 to 1997.

ADJUNCT ASSOCIATE PROFESSOR, University of South Florida, College of Public Health, Department of Environmental and Occupational Health - August 1992 to August 1993.

CORPORATE ENVIRONMENTAL TOXICOLOGIST, Florida Power and Light Company. Juno Beach, FL. April 1987 to June 1989.

Serve as the corporate advisor to largest electric utility company in Florida on issues of toxicological importance (e.g., air toxics, water toxics, hazardous wastes). Manage and develop all toxicology research programs to resolve/mitigate problems related to hazardous wastes/industrial effluents. Provide advice and guidance on cost-effective means to solve toxicology concerns. Prepare comments, toxicology reviews and environmental risk assessments regarding public health and ecological safety. Interact with regulatory agencies and trade associations.

Conducts laboratory and field studies on the acute and chronic effects of asbestos and effluents on freshwater and marine organisms, modeling/field validation studies on the fate of chemicals including heavy metals and petroleum in surface and groundwater and bioremediation treatment studies to degrade toxic compounds.

MANAGER, ENVIRONMENTAL TOXICOLOGY, Corporate Toxicology, FMC Corporation. Princeton, N.J. September 1985 to March 1987 (as Manager). (See below).

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SUPERVISOR, ENVIRONMENTAL TOXICOLOGY, Corporate Toxicology, FMC Corporation - January 1984 to August 1985.

Administratively responsible for the management of professional staff (including one Post-Doctoral Associate), preparation of budgets and long-range planning. Technically responsible for the management and design of all U.S. and international aquatic, avian and wildlife toxicology programs (i.e., totaling approximately 7 million dollars per year) to assess the safety of pesticides and other chemical compounds for registration.

Programs include laboratory and field (e.g., pond, mesocosm, terrestrial) studies with aquatic (i.e., freshwater, estuarine, marine) and avian species. Conducts ecotoxicological risk assessments for various agroecosystems. Prepared avian risk assessment for carbofuran in response to USEPA Special Review.

Responsible for risk assessment studies of agricultural field workers exposed to pesticides and other related matters. Coordinate activities on groundwater contamination and water pollution control. Provide technical support to corporate and division management on the fate and effects of chemicals in the environment. Interact with analytical, residue and metabolism groups to develop programs. Involved with pesticide registration process in the U.S. and in Europe including Special Review of a pesticide in the U.S. Serve as scientific liaison with state, federal and international regulatory agencies and contract facilities.

SENIOR TOXICOLOGIST, Corporate Toxicology, FMC Corporation - August 1982 to January 1984.

Responsible for the design and management of both intramural and extramural pesticide toxicology programs (i.e., totaling approximately 5 million dollars per year) which include acute, sub chronic and chronic (e.g., oncogenicity, reproduction) laboratory and field studies with mammalian, aquatic, avian and microbial species via different routes of administration. Programs also include genetic toxicity studies.

Conducts human and environmental health risk assessments. Responsible for providing toxicology support to management on health and safety assessments. Serve as liaison with trade associations, U.S. and international regulatory agencies.

ADJUNCT ASSOCIATE PROFESSOR, Drexel University, Environmental Studies Institute - February 1983 to February 1985.

Teach graduate courses in aquatic toxicology and aquatic ecology. Advisor/sponsor for Ph.D. students. Member of Ph.D. (2) committees in aquatic toxicology.

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ASSOCIATE CORPORATE TOXICOLOGIST, Corporate Toxicology, Occidental Petroleum Corporation (Hooker Chemical Company). Niagara Falls, N.Y. February 1979 to July 1982.

Responsible for management of staff, and the design and management of toxicology programs at various divisions of the company. Programs include acute and sub chronic mammalian studies and mutagenicity testing. Aquatic/environmental programs include studies with fish, invertebrates and birds that involve acute and chronic exposure. Also responsible for designing environmental fate studies.

Evaluation of data from mammalian and ecological toxicology programs and preparation of risk assessments on new chemicals and at hazardous waste sites in New York (Love Canal), Michigan (Montague) and California.

Provide technical support and guidance to the divisions, corporate staff (medical, industrial hygiene, safety) and management on toxicology problems and questions.

Provide reviews related to the toxicology of company products, intermediates and raw materials in order to evaluate their safety. Set internal company occupational exposure limits for chemicals in the plant

Provide community environmental education seminars and workshops on hazardous wastes and air, soil and sediment contamination.

Assure that toxicology policies, procedures and programs are in compliance with federal, state, and international regulations.

Initiate and coordinate biomonitoring programs at the divisions to evaluate the toxicity of effluents to aquatic life.

Provide special expertise in aquatic, environmental and mammalian toxicology and apply it to special environmental problems (e.g., waste disposal sites, groundwater contamination) and litigation.

LECTURER, State University of New York at Buffalo, School of Medicine - September, 1980 to May, 1982.

Lecture to freshman medical students in the area of environmental toxicology.

NATIONAL INSTITUTE OF HEALTH POSTDOCTORAL RESEARCH FELLOW/TRAINEE IN TOXICOLOGY, North Carolina State University - November 1977 to February 1979.

Research on the neurotoxic effects of acute and chronic pesticide exposure on aquatic and mammalian organisms.

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ENVIRONMENTAL TOXICOLOGIST, Raytheon Company - February 1976 to September 1977.

Perform contract-oriented toxicity studies to assess the effects of potentially toxic substances on aquatic organisms.

Conduct field studies and hazard assessments on environmental agents.

Responsible for designing and setting up an aquatic toxicology lab.

TEACHING ASSISTANT IN GENERAL BIOLOGY AND CELLULAR BIOLOGY, Texas A&M University - September 1972 to January 1976.

Research on the effects of pesticides and polycyclic aromatic hydrocarbons on aquatic organisms.

RESEARCH ASSISTANT IN GENETICS, Osborn Laboratories, New York Aquarium - September 1971 to August 1972.

SCIENCE TEACHER, New York - January 1966 to June 1971.

RESEARCH

Monitoring and Risk Assessment in Everglades Restoration: Chemical Contaminants in Everglades National Park, Biscayne National Park and Big Cypress National Preserve (2.2 million for 3 years- U.S. Dept. of the Interior; 2005-2008)

Fate, Uptake (Bioconcentration)/Depuration, Food Chain Transfer (Bioaccumulation) and Toxicity of Copper: Use of Apple Snails (*Pomacea paludosa*) and Fish as Models for Understanding Effects on Higher Trophic Levels (202K for 2 years-Funded by U.S. Fish & Wildlife Service; 2005-2007)

Freshwater Inflow and Wastewaters into Marine Systems: Effects of Salinity Changes and Development of Numerical Water Quality Criteria for Contaminants Using Physiological Performance Measurements Relevant to Estuarine Indicator Species in South Florida (349k for 4 years- Funded by National Park Service; 2002-2006)

St. Lucie Fish Health and Biological Performance Measures (200K for 2 years-Funded by NOAA; 2005-2007)

Use of Raccoons for Biomonitoring of Mercury Trends in Stormwater Treatment Areas as Bioindicators of Potential Mercury Threat to the South Florida Panther Population (200K for 2 years-Pending by U.S. Fish & Wildlife Service; 2006-2008)

Sediment Bioassay and Toxicity Identification/Evaluation Methods Adaptation to the Central and South Florida System (104K for 2 years-Funded by South Florida Water Management District; 2002-2004)

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Screening Level Risk Assessment to Determine Potential High Priority Contaminants and Natural Resources at Risk in Biscayne and Everglades National Parks: Critical Information Needs for the Comprehensive Everglades Restoration Plan (CERP) (747K for 3 years-Funded by U.S. Dept. of the Interior; 2001-2004)

Sediment Bioassay and Toxicity Identification/Evaluation Methods Adaptation to the Central and South Florida System (137K for 2 years-Funded by South Florida Water Management District; 1999-2001)

Initial Hazard Assessment of South Florida Ecosystems (27K-Funded by U.S. Geological Survey; 2000-2001)

Use of Biomarkers to Assess Stress of Chemicals on Ospreys in Florida Bay (20K- Funded by U.S. Dept. of the Interior, National Park Service; 2000)

Health Effects of Pesticides in Farm Workers (8.5K- University of South Florida/Funded by NIOSH; 2000)

Study of Gulf Coast Oil Contingency Plans with Respect to Remediation and Restoration (188K- collaboration with University of Miami & Nova Southeastern University: Funded by NOAA; 1996)

Evaluation of Biological Indicators for Assessment and Prediction of Adverse Ecological Impacts from Contaminants in Coastal Ecosystems (151K- collaboration with Mote Marine Laboratory: Funded by U.S.EPA Gulf of Mexico Program; 1995-1996)

Aquatic Risk Assessment of the Pyrethroid Mosquito Adulticide Resmethrin (55K- Funded by AgrEvo Chemical Co.; 1996)

Aquatic Risk Assessment of Malathion (80K- Funded by State of South Carolina; 1994-1996)

Fate and Effects of the Insecticide-Miticide (AC303, 630 3SC) using Outdoor Microcosms (350K- Funded by American Cyanamid Co.; 1992-1994)

Aquatic Risk Assessment of the Insecticide Carbaryl (50K-Funded by Rhone-Poulenc Ag Co.; 1993-1994)

Aquatic Risk Assessment of the Pyrethroid Fenpropathrin (45K-Funded by Valent Chemical Co./Sumitomo Chemical Co.; 1993)

Aquatic Risk Assessment of the Fungicide and Antifoulant Chlorothalonil (75K-Funded by ISK Biotech Co.; 1992-1993)

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Fate and Effects of the Insecticide-Miticide BAS 300 11 I using Outdoor Microcosms (1.8 million- Funded by BASF Corp.; 1992-1994)

Aquatic Risk Assessment of the Herbicide, Prodiamine (50K- Funded by Sandoz Crop Protection Corp.; 1991)

Laboratory Studies (Acute and Chronic) on the Fate and Effects of Chemicals (2-3 million/year-Funded by BASF, Monsanto, Dow Chemical, DuPont, Nissan Chemical, AgrEvo, American Cyanamid; 1989-1994)

Bioremediation and Ecological Risk of Soil Contaminated with #6 Fuel Oil (Ft. Meyers, FL) (250K-Funded by Florida Power & Light Co.; 1987-1989)

Effects of Effluents and Contaminated Sediments on Aquatic Organisms (150K- Funded by Florida Power and Light Co.; 1987-1989)

Effects of Organophosphate and Carbamate Insecticides on Birds and Wildlife Populations in Florida, Texas, Iowa, Illinois, Utah and

Wisconsin (5 million- collaboration with Brigham Young University: Funded by FMC Corp.; 1982-1987)

Effects of Pyrethroids (permethrin, cypermethrin, biphenthrin), Endosulfan and Organophosphates (ethion) on Aquatic Ecosystems using Outdoor Ponds and Simulated Systems (4 million- collaboration with Academy of Natural Sciences, Phila., ICI and Hoechst Corps., Makhteshim-Agan Chemical Co.: Funded by FMC Corp.; 1982-1987)

Avian/Wildlife Risk Assessment of the Insecticide Carbofuran (200K-FMC Corp.; 1983-1985) Laboratory Studies on the Acute and Chronic Effects of Pesticides on Aquatic and Avian Species (2 million-Funded by FMC Corp.; 1982-1987)

Acute and Chronic Effects of Effluents and Contaminated Sediments from the Niagara River, Great Lakes, Tacoma, Washington (500K-Funded by Hooker Chemical Co./Occidental Petroleum Corp.; 1979-1982)

Assessment of Ecological Damage Adjacent to Hazardous Waste Sites at Love Canal, NY, Montague, MI, Lathrop, CA, etc. (2 million-Funded by Hooker Chemical Co./Occidental Petroleum Corp.; 1979-1982)

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PROFESSIONAL AFFILIATIONS, MEMBERSHIPS, SCIENTIFIC ADVISORY PANELS

Ad Hoc Member U.S.EPA Scientific Advisory Panel-Federal Insecticide Fungicide and Rodenticide Act (2004)
Nonlinearity in Biology, Toxicology and Medicine (Founding Member, Editorial Board, 2003-present)
Biomarkers (Editorial Board, 1995-present)
Ecotoxicology (Associate Editor, 2000-2002; Editorial board, 2002-2004; Associate Editor, Marine Ecotoxicology, 2004 to Present)
Ecotoxicology and Risk Management Scoping Committee for the South Florida Restoration (1998-2003)
Ecological Risk Focus Group of South Florida Forum (1998-2002)
Expert Review Group for Lake Apopka North Shore Pesticide Evaluation (St. Johns River Water Management District) (1999-2003)
Society of Environmental Toxicology and Chemistry (Co-Chair Soil Advisory Committee, 1999-2001)
Agency for Toxic Substances and Disease Registry, Department of Health and Human Services (Board of Scientific Counselors, 1988-1991)
Edison Electric Institute (Chairman of Health Assessment/Toxicology Task Force, Safe Drinking Water Act Task Force, 1987-1989)
Utility Water Act Group (Biological Testing Subcommittee, Water Quality Subcommittee, 1987-1989)

Society of Environmental Toxicology and Chemistry; Charter Member
(Editorial Board of Society Journal, Hazard Assessment
Section, 1987-1989)
Electric Power Research Institute (Air Pollution/Inhalation
Toxicology Advisory Committee, 1987-1989)
National Agricultural Chemicals Association (Chairman of
Environmental Toxicology and Chemistry Committee, 1985-1987)
American Association for the Advancement of Science (1976-present)
Chemical Manufacturers Association (Water Quality Task Committee,
1979-1981)

CONSULTANCIES

Companies

AGIH
AgrEvo Chemical Company
American Cyanamid Company
BASF Corporation
E.I. duPont de Nemours & Company
Elanco Products Company
FMC Corporation
Henckel Americas
Hoechst-Roussel Agri-Vet Company
ISK Biotech
Makhteshim-Agan (America) Inc.
Monsanto Agricultural Company
Nissan Chemical

Agencies

USEPA
State Department
South Florida Water Management
St. Johns River Water Management

NGO

United Nations

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NOR-AM Chemical Company
PPG Industries, Inc.
Reckitt-Benckiser
Rhone-Poulenc, Inc.
Sandoz Crop Protection Corporation
Sumitomo Chemical America, Inc.
The Dow Chemical Company
Union Carbide Agricultural Products Co., Inc.
Uniroyal Chemical Company
Union Oil of California
Valent Chemical Company
Velsicol Chemical Company

WORKSHOPS

Organized/Chaired the following sessions/workshops:

South Florida Ecosystems at Risk. Sponsored by the Society of Environmental Toxicology and Chemistry at Twenty-Second Annual Meeting. November 2001. Baltimore, Maryland. Co-edited (with P. Gardinali) special monograph edition of Ecotoxicology published in 2004.

Environmental Effects on South Florida Ecosystems. Sponsored by the Society of Environmental Toxicology and Chemistry at Nineteenth Annual Meeting. November 1998. Charlotte, N.C.

Workshop on Ecological Risk of Toxic Substances in South Florida Ecosystems: Linking Exposure, Toxicological Effects and Risk

Management to Sustainable Restoration of Aquatic and Wildlife Ecosystems. Sponsored by Florida International University, U.S.EPA, NOAA and USGS. October 1998. Miami, FL.

Environmental Education. Sponsored by the Society of Environmental Toxicology and Chemistry at the Seventeenth Annual Meeting. November 1996. Washington, DC.

Aquatic Toxicology. Sponsored by the Society of Environmental Toxicology and Chemistry at the Seventeenth Annual Meeting. November 1996. Washington, DC.

Toxic Substances Roundtable. Sponsored by South Florida Water Management District. October 1996. West Palm Beach, FL. Facilitator and presenter of ecological and human health risk assessment seminars.

State of Practice of Risk Assessment in Human Health and Environmental Decision Making. December 1995. Florida State University, Tallahassee, Fl. Co-edited special monograph in Human and Ecological Risk Assessment 1998, Volume 4, Number 4.

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Wildlife Risk Assessment. Sponsored by the Society of Environmental Toxicology and Chemistry at the Second SETAC World Congress. November 1995. Vancouver, BC.

Avian Toxicity Field Studies. Sponsored by the National Agricultural Chemicals Association for industry, academia and the regulatory agencies. September 1986. Washington, DC.

Aquatic Toxicity Field Studies. Sponsored by the National Agricultural Chemicals Association for industry, academia and the regulatory agencies. October 1986. Washington, DC.

Pesticide Risk Assessment in Aquatic Systems. Sponsored by the Society of Environmental Toxicology and Chemistry at the Seventh Annual Meeting. November 1986. Alexandria, Virginia.

BOOK REVIEWS

Rand, G.M. Book: Quantitative Methods in Aquatic Ecotoxicology (MC Newman). Soc. Environ. Toxicol. and Chemistry Newsletter March 1997.

Rand, G.M. Book: Water Pollution Biology (PD Abel), second edition. Bull. of Marine Science Vol. 64, Issue 2, March 1999.

Rand, G.M. Fundamentals of Ecotoxicology (MC Newman). Soc. Environ. Toxicol. and Chemistry Newsletter May 1999.

Rand, G.M. Fundamentals of Ecotoxicology (MC Newman and MA Unger), second edition. Soc. Environ. Toxicol. and Chemistry Newsletter July-August 2003.

BOOKS

- Rand, G.M. and Petrocelli, S.R. (Editors). 1985. FUNDAMENTALS OF AQUATIC TOXICOLOGY: METHODS AND APPLICATIONS. Hemisphere Publishing Corporation, N.Y. Textbook/reference book. Recipient of honorable mention award for best Life Sciences book in 1985 at the Tenth Annual Professional and Scholarly Book Awards sponsored by the Association of American Publishers.
- Rand, G.M. (Editor). 1995. FUNDAMENTALS OF AQUATIC TOXICOLOGY: EFFECTS, ENVIRONMENTAL FATE AND RISK ASSESSMENT. Second Edition. Taylor and Francis, Washington, D.C.
- Rand, G. M., Lewis, M.A. and Klaine, S. (Editors). FUNDAMENTALS OF AQUATIC TOXICOLOGY. Third Edition. In Preparation.
- Rand, G.M., Lewis, M.A., and Calo, P. (Editors). CURRENT TOPICS IN ECOTOXICOLOGY AND ENVIRONMENTAL CHEMISTRY. Book series in

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preparation. First book published on Genetics and Ecotoxicology (1998).

PRESENTATIONS/PUBLICATIONS

- Rand, G.M. Contaminants: Pesticides. Invited paper presented to the National Academy of Sciences Committee on Independent Scientific Review of Everglades Restoration Progress. Key Largo, Florida. June 27, 2005.
- Carriger, J.F., Rand,*G.M., Gardinali, P.R., Perry, W.B., Tompkins, M.S. and Fernandez. A. In Press. Pesticides of Potential Ecological Concern in Sediment from South Florida Canals: An Ecological Risk Prioritization for Aquatic Arthropods. Soil & Sediment Contamination: International Journal.
- Rand, G.M. and Gardinali, P.R. 2004. South Florida Ecosystems. Ecotoxicology 13: 179-184.
- Pfeuffer, R.J. and Rand, G.M. 2004. South Florida Ambient Pesticide Monitoring Program. Ecotoxicology 13: 195-206.
- Rand, G.M. et al. 2004. Sediment Toxicity in the St. Lucie River Watershed and Everglades Agricultural Area. Ecotoxicology 13: 261-274.
- Rand, G.M., Carriger, J.F., Gardinali, P.R. Perry, W.B. and Fernandez, A. Sediment Risk Assessment of South Florida Canals. Paper presented at the 19th Annual International Conference on Soils, Sediment and Water. University of Massachusetts, Amherst, Ma. October 20-23, 2003.
- Rand, G.M. and Carriger, J.F. Screening Level Probabilistic Aquatic Ecological Risk Probabilistic Aquatic Ecological Risk Assessment of Canal C-111 and Adjacent Coastal Areas. Paper presented at the Joint Conference on the Science and Restoration of the Greater Everglades and Florida Bay Ecosystem. April, 2003. Palm

Harbor, FL. Paper in final preparation for Human & Ecol. Risk Assess.

Rand, G. M. 2004. Fate and Biological Effects of the Insecticide-Miticide Chlorfenapyr in Outdoor Aquatic Microcosms. *Ecotoxicology & Environmental Safety* 58: 50- 60.

Rand, G.M. and Wheat, J.V. A Diluter Control System for Flow-Through Toxicity Studies with Aquatic Organisms. Submitted to *Water Research*.

Rand, G.M. et al. Physiological Performance Measures and Tolerance Limits for Estuarine Indicator Species in South Florida. Invited paper presented at 23rd Annual Meeting of the Society of Environmental Toxicology and Chemistry. November 2002. Salt Lake City, UT.

Carriger, J.F., Rand, G.M. et al. Probabilistic Aquatic Ecological Risk Assessment of Pesticides in the C-111 Canal System in South Florida. Gary M. Rand, Ph.D. Curriculum Vitae- Page 14

Paper presented at 23rd Annual Meeting of the Society of Environmental Toxicology and Chemistry. November 2002. Salt Lake City, UT.

Rand, G.M. and Carriger, J.F. Aquatic Risk Assessment of Adult Mosquito Control Agents. Invited paper at the Florida Keys National Marine

Sanctuaries Mosquito Control workshop. Sponsored by DEP and NOAA. October 15 2002. Marathon, FL. Paper in final preparation for *Archives of Environ. Contam. & Toxicol.*

Rand, G.M. Overview of Ecotoxicology and Risk Assessment in South Florida Ecosystems. Invited paper at the Contaminants and Biogeochemistry Workshop for Greater Everglades Ecosystem Restoration (GEER). Sponsored by U.S.G.S. May 29 2002. Ft. Lauderdale, FL.

Rand, G.M. et al. 2003. An Automated Overlying Water-Renewal System for Sediment Toxicity Studies. *Environ. Pollut.* 122: 169-175.

Rand, G.M. et al. 2003. Sediment Toxicity in Central and South Florida Ecosystems. *Bull. Environ. Contam. and Toxicol.* 70: 494-501.

Rand, G.M. et al. Sediment Toxicity in the Central and South Florida Ecosystem. Paper presented at 22nd Annual Meeting of the Society of Environmental Toxicology and Chemistry. November 2001. Baltimore, MD.

Rand, G.M. et al. Initial Hazard Assessment of South Florida Ecosystems. Paper presented at 22nd Annual Meeting of the Society of Environmental Toxicology and Chemistry. November 2001. Baltimore, MD.

Lounsbury-Billie, M.J., Rand, G.M. et al. Mercury and Trace Metal Concentrations in Osprey Populations in Florida Bay. Paper presented at 22nd Annual Meeting of the Society of Environmental Toxicology and Chemistry. November 2001. Baltimore MD. Paper in final preparation for *Archives in Environmental Contam. & Toxicol.*

Coronel, L.R., Rand, G.M. et al. Atrazine Affects the Ability of Post-Larval Shrimp (*P. Vannamei*) to Resist Infection by *Vibrio harveyi*. Paper presented at 22nd Annual Meeting of the Society of Environmental Toxicology and Chemistry. November 2001. Baltimore MD.

Mahabir, S.P., Rand, G. M. et al. Effects of MTBE on soil organisms. Paper presented at 22nd Annual Meeting of the Society of Environmental Toxicology and Chemistry. November 2001. Baltimore MD.

Lee, T.A., Rand, G. M. et al. Effect of Irgarol 1051 on the Relationship between the Sea Anemone *Aiptasia pallida*, and its' Zooxanthellae Algae. Paper presented at 22nd Annual Meeting of the Society of Environmental Toxicology and Chemistry. November 2001. Baltimore MD.

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Lounsbury-Billie, M.J., Rand, G.M. et al. Trace Metal Concentrations in Osprey Populations in Everglades National Park. Paper presented at Greater Everglades Ecosystem Restoration Science Conference. December 2000. Naples, FL.

Rand, G.M. et al. Assessment of Sediment Toxicity in the St. Lucie River Watershed and Everglades Agricultural Area. Paper presented at Greater Everglades Ecosystem Restoration Science Conference. December 2000. Naples, FL.

Rand, G.M. et al. Initial Hazard Assessment of Sediment Toxicity in St. Lucie River Watershed and Everglades Agricultural Area. Paper presented at 21st Annual Meeting of the Society of Environmental Toxicology. November 2000. Nashville, TN.

Rand, G. M. 2002. Hazard Assessment of Resmethrin: I. Effects and Fate in Aquatic Systems. *Ecotoxicol.* 11: 101-111.

Rand, G.M. 2001. Hormesis and Ecological Risk Assessment. *Human and Experim. Toxicol.* 20: 525-526.

Rand, G. M. and Carriger, J. F. 2001. U.S. Environmental Law Statutes in Coastal Zone Protection. *Environ. Tox. & Chem.* 20: 115-121. Invited paper. Special Annual Review edition on Coastal Ecosystems.

Rand, G. M. et al. 2001. The Use of Outdoor Freshwater Pond Microcosms: III. Responses of Phytoplankton and Periphyton to Pyridaben. *Environ. Tox.* 16: 96-103.

Rand, G. M. et al. Linking Exposure, Toxicological Effects and Risk Management To Sustainable Restoration of Aquatic and Wildlife Ecosystems in South Florida. Paper presented at the 1999 Florida Bay and Adjacent Marine Systems Science Conference. November 1999. Key Largo, FL.

Rand, G. M. Comparative Aquatic Hazard Assessment of Resmethrin. Paper presented at 20th Annual Meeting of the Society of Environmental Toxicology and Chemistry. November 1999. Philadelphia, Pa.

Glickfield, G. J. and Rand, G. M. Modeling Exposure to Ethion and Bromacil in St. Lucie County's C-25 Canal and Indian River Lagoon. Paper presented at 20th Annual Meeting of the Society of Environmental Toxicology and Chemistry. November 1999. Philadelphia, Pa.

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Rand, G.M. 1995. Methods and Strategies in Ecological Risk Assessment:

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Implications for Risk Management. Invited paper presented at Third Annual Florida Environmental Expo. September 1995. Tampa, Florida.

Rand, G.M. 1995. Ecological Risk Assessments: Structure and Application. An invited paper presented at the 18th Annual Conference of the Florida Association for Water Quality Control. June 1995. Naples, Florida.

Rand, G.M. 1994. History of Aquatic Toxicology and Evolution of Field Studies in Risk Assessment. An invited paper presented at the Society of Environmental Toxicology and Chemistry Annual Meeting, November 1994. Denver, Colorado.

Rand, G.M., P.G. Wells and L.S. McCarty. 1995. Introduction to Aquatic Toxicology. In Aquatic Toxicology: Effects, Environmental Fate and Risk Assessment, G.M. Rand, ed. Taylor and Francis, Washington, D.C.

MacKay, D., L.A. Burns and G.M. Rand. 1995. Fate Modeling. In Aquatic Toxicology: Effects, Environmental Fate and Risk Assessment, G.M. Rand, ed. Taylor and Francis, Washington, D.C.

Spacie, A., L.S. McCarty and G.M. Rand. 1995. Bioaccumulation and Bioavailability in Multiphase Aquatic Systems. In Aquatic Toxicology: Effects, Environmental Fate and Risk Assessment, G.M. Rand, ed. Taylor and Francis, Washington, D.C.

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Rand, G.M. et al. 1993. Design and Aquatic Ecology of a Freshwater Microcosm. Presented at The Society of Environmental Toxicology and Chemistry Annual Meeting, November, 1993. Houston, Texas. Invited paper for publication in book "Ecological Risk Assessment of Pesticides: Enhancing the Process" to be published in 1995 by Society of Environmental Toxicology and Chemistry.

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Palmieri, M.A. and G.M. Rand. Hazard Evaluation of the Herbicide, Clomazone to Aquatic Organisms and Wildlife. A paper presented at the Society of Environmental Toxicology and Chemistry Annual Meeting, November, 1986. Arlington, Virginia.

Rand, G.M. Pyrethroids and Ecological Risk Assessment. An invited paper presented at the National Academy of Sciences, March, 1986. Washington, D.C.

Rand, G.M., D.E. Nye and G. Chester. Worker exposure to and adsorption of cypermethrin during aerial application of an "ultra low volume" formulation to cotton. A paper presented at the "Society of Toxicology 25th Annual Conference", March, 1986. New Orleans, LA.

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Rand, G. M. Agricultural Chemicals: Strategies and Concerns for the Environmental Chemist. An invited paper presented at the Association of
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Official Analytical Chemists Centennial Meeting, October 29-November 1, 1984.

Rand, G.M., J.R. DeProspero and M.J. Fletcher. Chronic Effect of Dietary Administration of Carbofuran on Beagle Dogs. A paper presented at the "Society of Toxicology 23rd Annual Conference", March 12-16, 1984. Atlanta, Georgia.

Rand, G.M. The Use of Behavioral Measurements to Assess Toxicant Induced Stress in Marine Organisms. Invited paper presented at the "International Symposium of Ecotoxicological Testing for the Marine Environment", September 12-14, 1983. Ghent, Belgium. Published in symposium volume. Ecotoxicological Testing for the Marine Environment Vol. 2, G. Persoone, E. Jaspers, C. Claus, eds. European Aquaculture Society, 1984.

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Evaluation", October 26, 1976. Sponsored by the American Society for Testing and Materials. Published in symposium volume. Aquatic Toxicology and Hazard Evaluation, ASTM STP634, F.L. Mayer and J.F. Hamelink, eds. American Society for Testing and Materials, 1977, 253-268.

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Rand, G.M., H. Kleerekoper and J. Matis. 1975. Interaction of Odour and Flow Perception and the Effects of Parathion in the Locomotor Orientation of the Goldfish, Carrassius auratus L. Journal of Fish Biology 7, 497-504.

EDUCATION

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|---|-----------------------------------|------------------------------------|
| NIH Postdoctoral Research Fellow/ Trainee in Toxicology | November, 1977- February, 1979 | North Carolina State University |
| Ph.D.: Biology- Environmental Toxicology | May, 1976 | Texas A&M University |
| M.S.: Marine Biology | October, 1972 | Long Island University |
| M.S. Education | October, 1972 | City College of N.Y. |

B.A.: Biology/Chemistry February, 1966

Hunter College of
the City Univ. of
New York

LANGUAGES

Working knowledge of French and Spanish.

