CURRICULUM VITAE

TAMARA EUGENIA AWERBUCH FRIEDLANDER

ADDRESS:

Department of Global Health and Popualtion
Harvard School of Public Health
Huntington Ave. Boston, MA 02115
Telephone: 617-432-2505
Telephone: 617-734-6472(home)
E-mail: tamara@hsph.harvard.edu
Fax: 617-432-6733

EDUCATION:

Hebrew University, Jerusalem,	B.Sc.	1965	Biochemistry
Hebrew University, Jerusalem,	M.Sc.	1967	Physiology
Hebrew University, Jerusalem,	Diploma,	1967	Education
Massachusetts Institute of Technology,	Ph.D.	1979	Biochemistry/ Metabolism Minor in Biostatistics Thesis in Biomathematics (Health systems): "Mathematics of diffusion bioassays: Mutagens and Antibiotics"
Massachusetts Institute of Technology,	Post-Doc	1979-81	Somatic Cell Genetics

LANGUAGES
English, Hebrew, Spanish (fluent)
German (understand and read)

SCIENTIFIC EXPERIENCE

1973-1975	Research staff in the Department of Nutrition and Food Science, Massachusetts Institute of Technology. Worked on the effects of chemical carcinogens on damage and repair of DNA of cells in tissue culture.
1976-1979	Ph.D.~student in the Department of Nutrition and Food Science, Massachusetts Institute ot Technology. Thesis: On Models for Stability and Mutagenicity of Carcinogens.
1979-1981	Center for Cancer Research, Department of Biology, Massachusetts Institute of Technology. Worked with the Somatic Cell Genetics Group on isolation and selection of glycoprotein mutants.

1981-1982 Memorial Sloan Kettering Institute. Worked in the area of tumor promotion with human cells. Also, Visiting Scientist, Center for Cancer Research, Department of Biology, Massachusetts Institute of Technology.

1982 summer Department of Biochemistry, Tel-Aviv University. Worked on mutagenic levels of aflatoxin with Dr. A.A. Stark.

1983-1984 Research Fellow in the Department of Biostatistics, Harvard School of Public Health.

1984-1993 Lecturer in the Department of Biostatistics, Harvard School of Public Health. Working on mathematical modeling of the mutagenicity and toxicity of chemical carcinogens, the spread of AIDS and Lyme disease.

1986 summer Department of Biochemistry, Tel-Aviv University. Worked on threshold mutagenic levels of chemical carcinogens with Dr. A.A. Stark.

1988-1989 Visiting Professor at the Department of Medical Ecology, School of Public Health, The Hebrew University, Jerusalem, Israel.

1988- summers Visiting Scholar at the School of Public Health, The Hebrew University, Jerusalem, Israel.

1995 fall Visiting Scientist at the Department of Parasitology, Hebrew University, Jerusalem, Israel.

1996- summers Visiting Scholar at the Department of Mathematics and the School of Public Health, The Hebrew University, Jerusalem, Israel.

1993- Today Lecturer in the Department of Global Health and Population (In the past called Population and International Health), Harvard School of Public Health, and at the Dana-Farber Cancer Institute.

SCIENTIFIC AND TEACHING AWARDS

1977-1978 Massachusetts Institute of Technology Graduate Award for Ph.D.~Studies.

1978-1979 Altrusa Foundation Award for Ph.D.~Studies.

1984-1987 National Institutes of Health Grant (New Investigator Award) for research on ``Mathematics of Diffusion Assays: Mutagens and Antibiotics".This project deals mainly with testing the sensitivity of the model for determining minimal inhibitory concentration of DNA-damaging agents and antibiotics; with the development of software for this purpose and with ranking the chemicals according to their potency.

1987-1990 National Institutes of Health Grant, continuation of ``Mathematics of Diffusion Assays: Mutagens and Antibiotics".

1988-1989 Fulbright Lectureship, to conduct research and to teach at the School of Public Health, The Hebrew University, Jerusalem, Israel.

1993 spring Burroughs Wellcome Travel Grant to participate in a program in Mathematical Epidemiology in the United Kingdom.

1994 spring Bok mini-award for innovations in teaching for the course, Mathematical Models in Biology, ID227cd.

1996-2000 Robert Wood Johnson Foundation Award to conduct research

on Why New and Resurgent Disease Caught Public Health by Surprise and A Strategy to Prevent This (co-P.I. with Richard Levins).

1998 spring Rockefeller Center for Latin American Studies ward for research in Cuba on Population Dynamics of Agricultural Pests.

1998-2000 Harvard provost awards (two) for inter-faculty collaboration on Mathematical Biology.

1999/02spring Rockefeller Center for Latin American Studies award for: research and collaboration in Cuba on Population Dynamics of Agricultural Pests, Mathematical Models in Biology and Public Health, Social Determinants of Health and the Environment.

2005-2006 Withh Richard Levins. Pilot grant for research on The aging Heart as a Criterion for Aging Populations.

2007 May-June Dozor award offered once a year to a foreign scientist by Ben-Gurion University- Israel. This time for a series of lectures on Mathematical Models in Public Health.

2013 February Award by the Canadian program: Mathematics for Planet Earth To give major presentation on this topic for the workshop held in the University of Montreal.

2013-2018 Fulbright Specialist Roster for Environmental Health and Mathematical Epidemiology 5 year program

PATENT

The diffusion bioassay as a quantitative method for the determination of half-life times and mutagenic concentrations of chemical carcinogens was granted a patent by the United States Patent Office (April, 1982), and also in Canada. The wide interest in the method is due to the simplicity and efficacy of the biological component, and the immediacy of the results one gets through calculations with the aid of the computer.

COMMUNITY WORK

- Teacher for the Girls' Angle group, based in Cambridge Mass., to improve girls competence in Mathematics. From October 2007.

- Helping residents in Cayuga Heights, NY to understand the scientific rationale against a deer killing program in their community of Cayuga Heights, NY, which their trustees wanted to implement for controlling Lyme disease. December 2010.

- Helping residents in Massachusetts communities to develop strategies for controlling Lyme disease:

    1) Dover & Sheborn in August 2012.

2) Televised discussion in Walpole. September 5, 2012.

3) Lecture in Weston, Mass on: Shall we kill deer for Controlling Lyme Disease? May 1, 2013

4) Article for the Town Crier: **Shall we kill deer for Controlling Lyme Disease?, Insights from Holistic Research** May 2013.

SEMINARS

The following places are among the several at which I gave seminars as invited speaker on: **The Stability and Threshold Concentrations of Chemical Carcinogens using the Diffusion Bioassay:**

Laboratory for Molecular Genetics; University of Leiden, Leiden, the Netherlands. January 1979. Host: Dr. B.W. Glickman.

Department of Statistics, Statistical Laboratory; University of California at Berkeley, Berkeley, California. September 1979. Host: Dr. J. Neyman.

Department of Radiological Sciences; University of California at Irvine, Irvine, California. October 1979. Host: Dr. J.P. Jones.

Laboratory of Community Medicine; University of California at San Diego, La Jolla, California. October 1979. Host: Dr. M. Shimkin.

Department of Applied Mathematics; The Weizman Institute of Science, Rehovot, Israel. January 1980. Host: Dr. L. Segal.

Department of Chemistry, the Physical Chemistry Seminar; Massachusetts Institute of Technology, Cambridge, Massachusetts. March 1980.

Department of Statistics, Departmental Colloquium; Harvard University, Cambridge, Massachusetts. April 1983.

Department of Biostatistics, Departmental Colloquium; Harvard School of Public Health. January 1984.

Department of Biostatistics, Bioassay seminar; Harvard School of Public Health. May 1986.

Boston Risk Assessment Group; Massachusetts Institute of Technology, Cambridge, Massachusetts. May 1987.

Laboratory of Toxicology; Harvard School of Public Health. March 1988.

Department of Biostatistics, Statistics and the Environment Seminar; Harvard School of Public Health. October 1991.

Seminars on AIDS:

Department of Biostatistics; Harvard School of Public Health. January 1988.

Departments of Mathematics and Biology; Southeastern Massachusetts University, North Dartmouth, Massachusetts. April 1988.

Kaplan Hospital, Rehovot, Israel. April 1988.

School Seminar; School of Public Health, The Hebrew University, Jerusalem, Israel. January 1989.

Department of Applied Mathematics; The Weizman Institute, Rehovot, Israel. March 1989.

Duke University Medical Center (National Biomedical Simulations Resource), Durham, North Carolina. October 1990.

Department of Statistics; University of Barcelona, Barcelona, Spain. February 1992.

Center for Adolescent Education; School of Public Health, Hebrew University, Jerusalem, Israel. August 1993.

Department of Biostatistics; HIV Working Group, Harvard School of Public Health, Boston, Massachusetts. April 1995.

Seminars on Lyme disease:

Department of Biology; Boston University, Boston, Massachusetts. February 1991.

Department of Parasitology; The Hebrew University, Jerusalem, Israel. August 1994.

Mathematics and Biology Departments Joint Colloquium; University of Massachusetts at Dartmouth, Massachusetts. March 1995.

Department of Population and International Health; New Diseases Group, Harvard School of Public Health, Boston, Massachusetts. April 1995.

Division of Health Improvement; Health Institute, New England Medical Center, Boston, Massachusetts. April 1995.

Department of Zoology; Tel Aviv University, Tel Aviv, Israel. December 1995.

Department of Parasitology; Hebrew University of Jerusalem, Jerusalem, Israel. January 1996.

Department of Organisms and Evolutionary Biology; Harvard Population Biology Seminar Series, Harvard University, Cambridge, October 1996.

Department of Population and International Health; Harvard School of Public Health; Bio- and Public Health Seminar Series. March 2000.

Boston Chaos Club: Interdisciplinary Seminars on Nonlinear Dynamics and Complex Systems in Biomedicine. Boston Massachusetts. January 2002.

Mathematics Department, University of Rhode Island, Kingston, RI. March 1, 2002

Third Annual Jonathan Freeman Symposium on the Epidemiology of Infectious Diseases. Harvard School of Public Health. May 2003

Department of Epidemiology and Public Health, Ben-Gurion University, Beer-Sheva, Israel, December 15, 2005.

Faculty of Life Sciences, Bar-Ilan University, Ramat-gan, Israel, January 3, 2008

Department of Global Health and Population, Harvard School of Public Health, Boston, October 18, 2012

Technology assessment in health care seminar series, Harvard University: *On Controlling Lyme Disease;* December 5, 2013:

Ariel University, Ariel, Israel "Population Dynamics of the lyme disease vector: a mathematical treatment" September 11, 2014.

Seminars on Emerging Diseases, Environmental Health and Human Ecology

Department of Biostatistics, Environmental Statistics Seminar. ``Fluorescent Radiation and Childhood Leukemia". December 1993

University of New Hampshire Seminars for Advanced High School Students.

``The Spread of Infectious Diseases". November 1997.

Department of Population and International Health, Harvard School of Public Health. ``Ecological Boundaries and Political Borders: Reemergence and Control of Rabies in Israel and the Surrounding Countries". November 1997.

Harvard School of Public Health, Department of Population and International Health.. ``Natural Control of Infectious Diseases of Plants in a Citrus Grove in Cuba". October 1998.

Washington Institute for Health in Israel. ``Ecological Boundaries and Political Borders: The Case of Rabies Reemergence in Israel and the West Bank". November 1998.

Harvard School of Public Health, Department of Population and International Health and Global Chat, ``An Ecologist in Cuba". December 1998

Harvard School of Public Health. " Foxes do not need passports :The Case Of Rabies In Israel And its neighbours." November 9,2005

Department of Middle-East Studies, Ben-Gurion University, Beer-Sheva, Israel. "Disease dynamics across political borders: The case of rabies in Israel and the surrounding countries". December 14, 2005

Institute of Tropical Fruit-cultures Investigation, Cuban Ministry of Agriculture; "Lack of Ecological Considerations leading to Failures of Attempted Disease Eradication" January 25, 2006

Institute of Ecology - Havana, Cuba: "Modeling an intervention against mosquitoes that transmit Dengue a complex system approach." February 28, 2007

Institute of Philosophy – Havana Cuba: "Combining variables from different disciplines to understand human consciousness response to the emergence of an epidemic: the case of Dengue" February 28, 2007.

Institute of Fruits and Citruses, Ministry of Agriculture – Havana, Cuba: " A Basic Reproduction Number (R0) for infectious diseases of plants – constructing the equation." – January 14, 2008

Institute of Ecology - Havana, Cuba: "Global Warming Impact on the Spread of West Nile Virus" – January 21, 2008

Department of Mathematics- The University of Havana: " Using Difference Equations for constructing and analyzing complex interactions in Public Health Sciences" – January 22, 2008

School of Public Health – Havana, Cuba: “An interdisciplinary study for controlling Dengue via environmental intervention”. – January 23, 2008

Department of Geography, Tel Aviv University, Israel: “ Disease dynamics across political borders: The Case of Rabies in Israel and the surrounding countries.” – July 7, 2008

Department of Parasitology, Medical School, Hebrew University, Israel: 'The impact of global warming on the spread of West Nile Virus and Lyme disease" January 25, 2009

Institute of Fruits and Citruses, Ministry of Agriculture – Havana, Cuba: “ The effect of Global warming on the dynamics of pest populations.” – March 2, 2009

Institute of Fruits and Citruses, Ministry of Agriculture and Institute of Ecology – Havana Cuba, “What Social Ecology has in Common with the Ecology in Nature” – February 25, 2012.

Department of Mathematics- The University of Havana, Cuba, “Trends and oscillations in the Dynamics of Vector Populations carrying Disease”. March 24, 2012

Faculty of resources of the sea, University of Antofagasta- Antofagasta, Chile.”The Dynamics and Persistence of Pathogens in a Patchy environment: a spatial model for the spread of disease”. March 31,2014.

Seminars on the Aging Heart

Program on the Global Demography of Aging- Harvard University, Cambridge, Massachusetts: “ The aging Heart as a Criterion for Aging Populations ”March 12th, 2007.

PROFESSIONAL SOCIETIES:

Society for Mathematical Biology.

American Association for the Advancement of Science.

American Society for Microbiology.

Boston Risk Assessment Group.

Israeli Society for Theoretical and Mathematical Biology.

Boston Chaos Club.

CONFERENCES AND WORKSHOPS:

1979 June 11-16 Gordon Research Conference on Theoretical Biology and Biomathematics. Invited participant.

1984 Oct 22-26 The First Workshop of the National Biomedical Simulation Resource (NBSR-NIH funded and located in Duke University). Invited participant.

1985 April 1-4 First European Biometric conference in Budapest, Hungary. Selected paper: Determination of Half-lifetimes and mutagenic concentrations of chemical carcinogens via a Quantitative Analysis of Diffusion Bioassays.

1986 June 9-13 Gordon Research Conferences on Theoretical Biology and Biomathematics. Invited participant.

1988 Nov 7-9 Symposium on Computer Application in Medical Care. Organizer of the Panel on AIDS. Washington DC.

1989 April 3 The Annual Meeting of the Israeli Society for Epidemiology. Invited paper: Models for the Spread of AIDS.

1989 June 18-20 International Workshop on Clinical Pharmacy Epidemiology of Antibiotic Drug Use. Held in Israel. Invited Paper: A Computerized Method for Determining Minimal Inhibitory Concentrations.

1990 June 11-16 Gordon Research Conference on Theoretical Biology and Biomathematics. Invited participant.

1991 April 1-4 Eighth International Conference on Mathematical and Computer Modelling. Invited papers: (i) Sexual transmission of HIV vs.~transmission via drug abuse. (ii) A multiple matrix model for the life cycle of the tick that transmits Lyme disease.

1991-1992 Member of the program committee for the VIII International Conference on AIDS held in Amsterdam in July 1992.

1991 Nov 17-20 Annual meeting of the Society of Vector Ecology in Reno: Invited speaker in the symposium on Mathematical and Computer Modeling Research in Vector Ecology and Management.

1991 Dec 1-*5* ***Annual meeting of the American Society of Tropical Medicine and Hygiene in Boston. Organizer of the symposium. Models of Vector-borne diseases session on December 3.***

1992 May 26-30 General meeting of the American Society of Microbiology. Paper on *in vivo* and *in vitro* growth rates of *Lactobacillus*.

1992 May 30-J 2 V International Conference on Lyme Borreliosis, Washington D.C. Paper on the effect of mouse abundance on the density of the vector of Lyme disease.

1992 June 8-12 Gordon Research Conference on Theoretical Biology and Biomathematics. Invited speaker on bacterial dynamics in a diffusion assay.

1992 Nov 23-27 ***Workshop on the Modelling of Vector-Borne Diseases at the International Laboratory for Research on Animal Disease (ILRAD), Nairobi, Kenya. Invited speaker on host density and tick dynamics.***

1993 April 16 Fifth Stony Brook Conferene on Biomathematics, Stony Brook, New York.

1993 May 19-20 NATO Advanced Research Workshop on Lyme Borreliosis, London, England. Paper on the role of host abundance in the ecology of Lyme disease.

1993 May 21-J 1 ***Program on Models of Epidemics, Isaac Newton Institute of Mathematical Sciences, Cambridge, England. Invited participant.***

1993 Oct 6-8 Conference on Disease Prevention Research at N.I.H.: An Agenda for All. Bethesda, Maryland. Invited participant.

1993 Nov 7-8 Woods' Hole Conference on Emergent and Resurgent Diseases. Led the workship on mathematical modelling.

1993 Nov 28-30 Workshop on Remote Sensing and Malaria in Belize, USUHS, Bethesda, Maryland. Invited speaker.

1994 May 26-28 Conference on Spatial Stochastic Models in Biology, University of Colorado at Colorado Springs, Colorado. Invited main speaker on a cellular automata model for sexual regulated fertility of ticks.

1994 June 1-3 Harvard Center for Risk Analysis Fifth Annual Advisory Committee Meeting, Boston, Massachusetts. Invited participant.

1994 Aug 1-4 ***First Middle East Regional Coordinating Workshop on Integrated Pest Management of Insects Harmful to Agriculture and Public Health, Taba, Egypt. Invited participant.***

1995 April 10 Symposia on Public Health Issues; Understanding Complexity: Use of Biomathematics in Public Health. Harvard School of Public Health. Moderator of symposium.

1995 May 23-27 International Conference on Mathematics for Population Dynamics. Head of session on cellular automata and spatial dynamics.

1995 Nov 26-D1 Ninth International Conference on AIDS Education: Interventions in Mult-Cultural Societies. Jerusalem, Israel. Paper on the use of AIDS educational software to personalize risky behavior.

1996 March 30 Second Regional Symposium on Matrix Population Models and their Applications. Woods Hole Oceanographic Institution, Woods Hole, Massachusetts. Presented paper on Seasonal Matrices to Study Population Dynamics of the Lyme Disease Tick.

1996 June 2-5 Workshop on the Use of Remote Sensing for Predicting Malaria in Belize. Presented paper on spatial models for studying the effect of patchy habitats on the spread of malaria.

1996 Oct 15-17 Robert Wood Johnson Foundation Conference on Health Policy Research (Miami, FL). Presented paper on: Evolution of the Epidemiological Transition Concept and its Impact on Public Health.

1997 Oct 28-30 Robert Wood Johnson Foundation Conference on Health Policy Research (Charleston, NC). Presented paper on: Preparedness for Infectious Diseases; the Israel Experience.

1998 Aug 13-16 ***Fourth Nordic Conference on Middle Eastern Studies; The Middle East in a Globalized World. Presented paper on: Ecological Continuum and Disease Transmission across Political Borders between Israel and its Neighbors.***

1998 Oct 15-17 Robert Wood Johnson Foundation Conference on Health Policy Research (Santa Fe, NM). Presented paper on: Approaching Complexity in Exploring Epidemic Spread.

1998 Nov 18 Robert Wood Johnson Foundation Workshop on Social Determinants of Health (Washington DC). Group Response for Website Health People 2010.

1998 Dec 31-J1 Israeli Society for Theoretical and Mathematical Biology Annual Meeting (Sdeh-Boker, Israel). Presented poster on: A cellular automata model for simulating the effect of a patchy environment on the spread of disease.

1999 May 11-12 New York Academy of Sciences Conference on Social Determinants of Health (Washington DC). Invited Participant.

1999 Jun 28-J 3 European Conference on Theory and Mathematics in Biology and Medecine (Amsterdam). Presentation: The Spread of Disease in a Patchy Environment: A Cellular Automata Study.

1999 Jul 25-30 XIVth International Plant Protection Congress (Jerusalem). Presentation and discussion on: Dynamics of the Scale and its Natural Enemies in a Citrus Grove at Ceiba, Cuba.

1999 Oct 21-23 Robert Wood Johnson Foundation Conference on Health Policy Research (New Hampshire). Presented paper on: Public Health Solutions to Problems of Modern Times: Addressing Reductionism, Linear Thinking, and the Isolation of Disciplines.

1999 Nov 28-D 4 Workshop in Mathematical Epidemiology of Infectious Diseases. Mathematisches Forschungsinstitut Oberwolfach, Germany. Presented paper on: Seasonal Transitional Matrices for the Population Dynamics of the Lyme Disease Tick.

2000 Mar 6-11 Fourth International Conference on Operations Research at the University of Havana, Cuba. Presented paper on: Methods for Analyzing Data on Control of Pests in their Natural Environment: The Case of the Scale in a Citrus Grove at Ceiba, Cuba.

2000 Jun 1-3 "The Truth is the Whole: A Symposium in Celebration of The Unity and Dynamic Complexities of Life" Festschrift in honor of the 70th birthday of Richard Levins, Chair of program and organizing committee and Chair of the session: Making the Obscure Obvious with mathematics. Boston, MA

2002 Mar 27-29 VI Seminario Internacional, Paz, Recursos Naturales y Sociedad, Havana, Cuba. Presented paper: Peaceful Cooperation for Controlling Infectious Diseases on Israel and the Surrounding Countries.

June 14-16, 2002 . *2nd International Conference of The International Society for Equity and Health*, Toronto, Canada. Presented paper: Ecology of Health: Vulnerability as Variability.

May 18-24, 2003. *Dibner History of Biology Seminar: "Human dimensions of ecology",* Woodshole, Massachusetts, Invited participant. Contributed to the discussions on Ecology of Health.

Oct 8-11, 2003, *Robert Wood Johnson Foundation Meeting in Health Policy Research,* **Wasington DC.** Invited discussant**.**

May 31- June 3, 2004, *II International Congress on Dengue and Yellow Fever Havana, Cuba,* Panelist on Dengue control.

March 2 – March 3, 2005, *International Conference on Biosafety and Biorisk, Lyon, France,* Invited Participant.

January 9 – January 13, 2006, *III Biannual International Symposium on the Theory of Complex Systems, Havana, Cuba,* Invited Participant.

March 22- March 26, 2006, *European Social Science History Conference,* Paper presentation*:* Social Inequalities And Their Consequences On Health Of Populations, The case of the US and Japan.Amsterdam, The Netherlands.

June 26-29, 2006. *The Second Jerusalem Symposium on Arthropod-Borne Viral Diseases* Invited participant on: Modeling the ecological impact on vectors and reservoir of the West Nile Virus. *(see section on Abstracts). Jerusalem, Israel*

November 18-21, 2006. *40th Anniversary Meeting of the Middle East Studies Association of North America (MESA). Invited paper:* Complexity along Historical Pathways: Failures and Successes of Attempted Eradication of Infectious Diseases in Israel and the Surrounding Countries-the 20th Century. Boston, Mass.

February 20-22, 2007. *Interdisciplinary Workshop on Complexity. Invited paper*: Co-dynamics of Communal Consciousness and Mosquito Populations. Camaguey, Cuba.

January 15-18, 2008. *International Symposium on Complexity. Invited paper*: Controlando enfermedades transmitidas por mosquitos: Interacciones complejas entre comunidad-medioambiente. Havan, Cuba.

March 15-16, 2008. *American Mathematical Society Meeting.* Invited paper: Modeling Public Health Systems with Difference Equations. Courant Institute, New York University.

January 5, 2009. *American Mathematical Society, National Annual Meeting.* Invited paper: Trends and oscillations in the dynamics of linear vs. non-linear difference equation models describing populations. , Washington DC.

February 23-27, 2009. *Interdisciplinary Workshop on Complexity. Invited paper*: The aging heart and the loss of complexity. Camaguey, Cuba.

January 13-16, 2010. *American Mathematical Society, National Annual Meeting.* Invited paper: The Aging Heart and the Loss of Complexity- a Difference Equation Model. Preliminary report. San-Francisco, California.

March 4-6, 2010 ***I****nstitute of Biological Engineering, 2010 Annual Conference; Section Complex Systems Research in Biology & Medicine.* Invited paper: The emergence of a tick-borne disease: The case of Lyme disease. Boston, Mass.

July 19-23, *2010 16th International Conference on Difference Equations and Applications.* Invited paper**:**The loss of"chaotic" variability in the beat of the aging heart – constructing a delay difference equation. Riga, Latvia

November 22-26, 2010 *National Institute of Agricultural Sciences, XVII International Scientific Congress.* Invited paper : Mathematical Modeling of natural control of pests in Cintrus in Cuba: The case of *Lepidosaphes gloverii* and its natural enemies. San Jose de Las Lajas, Cuba.

January 20-22, 2011 *First EastBordNet Conference, Remaking Borders,* Invited paper**:** Disease Transmission across political borders: The case of Rabies of Israel and the surrounding countries., Ctania, Sicily**.**

June 12, 2011 *The Language and Cognitive Development Center, A workshop on The Miller Method- a Holistic approach for Treating Children in the Autistic Spectrum*. Held in Mount Ida College, Newton Massachusetts. Workshop discussant.

August 1-2 2012*, ICare4Autism, International Autism Conference***;** Invited paper**:** Cognitive-developmental systems approach in the treatment of Children with Autism Spectrum Disorder – a 12 months study. Held in Jerusalem, Israel.

December 2-3, 2012 *Cuba Salud, International Conference in Public Health***;** Invited Paper: The Dynamic of Consciousness in Epidemiology, Havana, Cuba

February 13-15, 2013 *Workshop on Mathematics of Planet Earth: Models and Methods in Ecology and Epidemiology:* Invited papers: 1) Lyme disease spread in the Context of a Complex Ecology: Emergence, Seasonality and Global Warming; Models with Difference Equations. 2) Dynamics of a pest and its Natural Enemies in a Citrus Grove in Cuba. CRM, Department of Mathematics, University of Montreal, Montreal. Canada

30 June & 1-3 July 2013 *8th Annual International Conference on Mathematics & Statistics: Education & Applications*, *Teaching the analysis of COMPLEX SYSTEMS as a Problem Oriented Approach: Mathematical Models in Biology and Public Health, ,* Athens, Greece.

July 21 - 25, 2014 The *20th International Conference on difference Equations and Applications*. Co-Dynamics of Variables Involved in Dengue Transmission by Mosquitoes, and its Control: A System of Four Difference Equations. Wuhan, China.

August 24-29, 2014 *A system of four difference Equations for exploring the Dynamics of Dengue spread and its control (Preliminary studies).* Ariel, Israel.

TEACHING EXPERIENCE

Designer and teacher of the course: Mathematical Models in Biology and Public Health at the Harvard School of Public Health. All Spring semesters since 1985,

Chair of the Israeli Complementary School Committee, (Grades K through Junior High Brookline) Ma 02445. 1998/99.

Teacher of the course Mathematical Models in the Life Sciences. Citrus Institute, Havana Cuba. February/ March 1, 2000.

Teacher in the Interdisciplinary Malariology Course ID201c,d on conceptual models in the Springs of 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998.

Teacher of the Emerging Disease Course PIH257d. Springs of 1997, 1998, 1999, 2000, 2001, 2002.

Teacher in the Experimental College at Tufts University: Emerging Infectious Diseases in a Changing World; Spring 2004.

Designer and Instructor of the course: Mathematical Models of Complex Systems, Institute of Philosophy , National Academy of Sciences, Havana , Cuba, January 16-22, 2006.

Teacher in the program Girls' Angle- a Math Club for girls in Cambridge, Mass. for Girls ages 10 to 14., Fall 2007,

Designer and Instructor of the course: Mathematical Models of Complex Systems, Departments of Marine Ecology and Public Health, University of Antofagasta, Chile, April 27 – May 5, 2008, November 1 – 15, 2009, March 14 -21, 2011, March 12-19, 2012, March 20 to April 8, 2014.

Taught the course "Mathematical Models for Dengue Control in the context of the "13th International Dengue course held in Pedro Kouri Institute, Havana Cuba 12-23 August 2013

Student Project Adviser to:

Elizabeth F. Ryder. Worked on computer models of diffusion bioassays for mutagens. Spring 1985. Publications: (a) *Computer Methods and Programs in Biomedicine* 25:31-38, 1987. (b) *SIAM Institute for Mathematics and Society*, Technical Report \#21, 1987.

Isabelle Romieu. Modelling the AIDS Epidemic in Mexico. Spring 1988 to Spring 1989. Publication: *Human Biology* 63:683-695, 1991.

Christl Donnelli and Wendy Leisenring. Worked on comparison of transmission rates of HIV1 and HIV2 in a cohort of prostitutes in Senegal 1990-1991. Publication: *Bulletin of Mathematical Biology* 55:731-743, 1993.

Christoph Heuschkel. Worked on a model for the risk of contracting dracunculiasis under low exposure to infected larvae. Spring 1991. Publication: *Abstract for the 40th Annual Meeting of ASTM\&H,* p.~123.

Anthony Kiszewski. a)Worked on a model to study the effect of mating behavior on the regulation of the life cycle of the deer tick. Spring 1992. Publication in: *Proceedings of the First International Conference on Tick-Borne Pathogens at the Host-Vector Interface* 328-334, 1992. b) Virulence of vector-Borne Pathogens: A stochastic Automata Model of Perpetuation. Publication in: Wilson, Levins, and Spielman (eds.) *Disease in Evolution*. New York: New York Academy of Sciences, 1994, 249-259.

Carlos Avila. Worked on models to study the spread of HIV among new-borns in Latin American countries. Spring 1992-1993. Publication: *Abstract in the IX International Conference on AIDS,* Berlin, Germany, July 1993.

Nicholas Komar. Worked on a mathematical model for Eastern Encephalitis. Springs of 1992 and 1993. Publication in*: Proceedings of the 81st Annual Meeting of the New Jersey Mosquito Control Association,* Atlantic City, New Jersey, March 1994.

Madeleine Rothberg. Software development for AIDS education. Spring 1993. Publication: *Journal of Science Education and Technology*, 3: 64-70, 1994.

Hillary Stone. Used GIS for studying the association between the spread of deer and Lyme disease.Spring 1994.

Cynthia Lopez. Modeling conditions that will lead to cholera outbreaks on the United States - Mexican border. Spring 1995.

Clarissa Valim. Mathematical models for the spread of epidemics. Spring 1995.

Ivo Foppa. Mathematical models for the spread of zoonotic diseases. Spring 1996.

Satoshi Kaneko. A cellular automata model for the spread of malaria. Spring 1997.

Bryan spencer. Simulating the entomological impact of an insecticide-impregnated

bednet intervation. Spring 1998.

Emily Rudomin attending Francis W. Parker Charter Essential School & Regional Teachers Center, Devens, MA. On; *How does the healthcare system of Sierra Leone affect the spread of AIDS*? Senior Project Advisor, Spring 2001.

Adam Karpati and Sandro Galea. Variability and vulnerability at the ecological level: Implications for understanding the social determinants of health. Spring *2000.* Appeared in *American Journal of Public Health*, 92:1768- 1772, 2002.

Caroline Korves, West Nile Virus: Building a differential equations model to represent transmission and evaluate surveillance indicators and possible interventions. Spring 2002. Topic developed for her thesis presented in September 2004.

David Rehkopf, Modeling the spread of Tuberculosis: a Cellular Automata Model. Spring 2003. *Poster presentation in the 2nd International Conference on Urban Health (Oct 16-19,2003)*

Barak Epstein, A mathematical model for the life cycle of WNV within local and migrating birds with two mosquito species as the vectors. master thesis, Ben-Gurion University, Israel, Summer 2006 to January 2007.

Laura Zager – R0 of epidemics via social network modeling – as member of Ph.D. thesis committee. MIT Spring 2007 to Fall 2008.

Anders Huitfeldt - Behavioral Change after introduction of Pre-Exposure Prophylaxis – A modeling approach – Paper developed for a biomathematics project. Spring 2011

Hyung Park (**Biostatistics)**, **Published:** Managing Populations with Unimodal Dynamics, Co-authors: Levins R., Awerbuch T., Hyung Park *Applied Mathematics* 4, 85-91, 2013

Shao-Chiu Juan (GHP) – **Completing the pape**r: *Socio-economic Determinants of Health in Taiwan: A Study of Eco- vulnerability*. Co-authors: Shao-Chiu Juan, Tamara Awerbuch, Richard Levins 2014

OTHER ACADEMIC ACTIVITIES:

Member of the Working Group on Bioassays for Carcinogens, led by Dr. T.Louis. Summer 1983 to Summer 1987.

Organizer (together with Dr. H. Feldman) of the fall seminar series: ``Mathematical Modeling". Fall 1984, 1985, and 1986.

Collaborator with Dr. P. Boiron, Mycology unit of the Institut Pasteur, on developing the Diffusion Bioassay for determining minimal inhibitory concentrations of antibiotics, summer 1988.

Member of the Technical Advisory Committee of the Vector Biology Control program. Agency for International Development. May 1990.

Member of the Harvard Complex Mixture Risk Assessment Group, led by Dr. J.Bailar. Summer 1987 to Summer 1990.

Official Collaborator with the National Biomedical Simulation Resource (Duke University) to Develop Software for the Construction and Analysis of Mathematical Models. Since May 1990.

Reviewer for scientific journals, such as the European Journal of Cancer and Clinical Oncology, Theoretical Population Biology, and Biometrics.

Reviewer of NSF grants in Applied Mathematics.

Member of NIH study section and council for grants on Clinical Studies of Chronic Lyme Disease. Spring 1996.

Co-Investigator in Training Grants:

Biostatistics departmental graduate training grant in Environmental Health. July 1988 to June 1993.

Biostatistics departmental graduate training grant in AIDS. September 1989 to August 1994.

Interdepartmental New Disease training grant for Foggarty Fellows. September 1997 to August 2002.

Interdepartmental infectious disease epidemiology training grant. September 1998 to August 2003.

Investigator in the project: ``Statistical Model of the AIDS Epidemic", P.I.: Marcello Pagano. Funded for five years starting Oct. 1989 by NIH.

Investigator in the project: Models for the Ecology of the vaginal microflora. P.I. Andrew Onderdonk, Director of the Clinical Microbiology Laboratory in Brigham and Women's Hospital. 1991

Co-chair of the Committee on Bio- and Public Health Mathematics at the Harvard School of Public Health. Since December 1990.

Member of the New Disease Group studying the factors involved in the emergence and re-emergence of infectious diseases. Spring 1992 - 2000.

Consultant to the NASA funded project on malaria in Belize. January 1996 to January 1998

Organizer of New and Resurgent Diseases Seminar Series, Harvard School of Public Health. Since 1996.

Visiting Scientist in the Research-in-Pairs Program of the Mathematisches Forschungsinstitut Oberwolfach, Germany. June 20 to July 4, 1998. Worked on non-linear terms in seasonal transitional matrices for the population dynamics of the Lyme disease ticks.

Visiting Scientist in the Citrus Institute, Ministry of Agriculture, Cuba. February 1998, 1999, 2000.

Co-organizer of a workshop in Mathematical Biology, Mathematics Department, University of Havana, Cuba (lectured in Spanish). February 1998.

Participant in the short course Chautauqua Program on Teaching Dynamical Systems, Boston University, Boston Masssachusetts, June 7 to June 9, 1999.

Advisory Board Member of the NIH/NCRR Research Resource for Complex Physiological Signals. Harvard Medical School. PI: Dr. Ary Goldberger. September 1999 – spring 2005.

Member of the Working group on Social Inequalities and Health Disparities 2004-2006

Participant in the Science and Technology Centers (STC) program pre-proposal. review panel, held at NSF headquarters in Arlington VA on September 27 and 28th, 2011,.

IN TEXT BOOK:

A whole section is dedicated to the mathematical model for diffusion bioassays in: ``Mathematical Models in Biology'' by Edelshtein-Keshet, Random House, 1988.

IN ENCYCLOPEDIA:

Awerbuch-Friedlander T, and Levins R. Mathematical Models for Health Policy. in *Mathematical Models*, [Eds. Jerzy A. Filar, and Jacek B. Krawczyk], in *Encyclopedia of Life Support Systems (EOLSS)*, Developed under the Auspices of the UNESCO, Eolss Publishers, Oxford ,UK, [http://www.eolss.net] , 2006

PUBLICATIONS:

Research Publications:

Ginzburg B.Z., Awerbuch- Friedlander T., Pouchovsky E., Specific binding of sodium and potassium ions in erythrocyte membranes, Nature 216:1185-1188, 1967

Awerbuch T. and Avnimelech Y. Counting of P^{32} in plant tissues using the Cerenkov effect, *Plant and Soil* 33:260-264, 1970

Awerbuch T.E., The utilization of phosphate in tomato plants at different growth stages, *Plant and Soil* 43:443-450, 1975

Awerbuch, T.E., Samson, R., and Sinskey, A.J., A quantitative model for diffusion bioassays, *Journal of Theoretical Biology* 79:333-340, 1979.

Awerbuch, T.E., and Stark, A., Plate diffusion assay as a rapid method for dosimetry of mutagens, *Applied and Environmental Microbiology* 33: 1127-1131, 1979.

Baker RM, O'Brien WA, III, Hirschberg C, Spencer LA, Awerbuch T, Weisman TO: Selection of CHO cells with reduced carbohydrate incorporation by means of 3H-Mannose suicide. *J Cell Biol* 83:453-459, 1979.

Awerbuch, T.E., and Sinskey, A.J., Quantitative determination of half-life times and mutagenic concentrations of chemical carcinogens using a diffusion bioassay, *Mutation Research* 74: 125-143, 1980.

Baker, R.M., Hirshberg, C.B., O'Brien, W., Awerbuch, T.E., and Watson, D., Isolation of glycoprotein mutants, in: Colowick/Kaplan (Ginsberg, ed.) *Methods in Enzimology* 83: 444-458. Complex Carbohydrates, Part D, 1982.

Awerbuch, T.E., and Sinskey, A.J., The effect of different genetic properties of *S. typhimurium* on the determination of stabilities and mutagenic concentrations of chemical carcinogens using the diffusion bioassay, *Mutation Research* 113: 13-19, 1983.

Awerbuch, T.E., Ryder, E.F., Faraggi, D., A program which determines mutagenic concentrations of chemical carcinogens via a diffusion bioassay. *Computer Methods and Programs in Biomedicine* 25: 31-38, 1987.

Awerbuch, T.E., and Lustman, L., A mathematical model for determining minimal inhibitory concentrations (MIC's) via diffusion assays, *Journal of Theoretical Biology* 129: 219-230, 1987.

Feldman, H.A. and Awerbuch, T.E., Radial diffusion assays: a mathematical basis for statistical analysis and exposure modeling. In *Biomedical Modeling and Simulation* (ed. J. Eisenfeld and D.S. Levine). J.C. Baltzer AG, Basel, 1989, pp. 107-110.

Awerbuch, T.E., Lustman, L., and Piret, J.M., A numerical method to determine minimal inhibitory concentrations (MIC's) of antibiotics directly from disc-diffusion susceptibility tests. Journal of Microbiological Methods 9: 1-7, 1989.

Sandberg, S. and Awerbuch, T.E. Mathematical formulation and studies of the risk parameters involved in HIV transmission. Bulletin of Mathematical Biology 51: 467-474, 1989.

Kanamori, A. and Awerbuch-Friedlander T.E., The Complete 0^f. Zeitschrift *f*ur Mathematische Logikund Grundlagen der Mathematik 36: 133-141, 1990.

Kalish, L.A., Awerbuch, T.E., Bailar, J.C., Bailey, J., Harris, C., Malcolm, A.R., Prager, J.C., Design and classification issues in assessing the risk of complex mixtures. *Dangerous Properties of Industrial Materials Report*, 11: 406-415, 1991.

Romieu, I., Sandberg, S., Mohar, A., Awerbuch, T.E., Modeling the AIDS Epidemic in Mexico City. *Human Biology*, 63: 683-695, 1991.

Shtarkshall, R.A. and Awerbuch, T.E., It takes two to tango but one to infect: on the underestimation of the calculated risk for infection, stemming from non-disclosure of either previous risk behavior of seropositivity. *Journal of Sex and Marital Therapy*, 17: 121-127, 1992.

Sandberg, S., Awerbuch, T.E. and Spielman, A., A comprehensive multiple matrix model representing the life cycle of the tick that transmits the agent of Lyme disease *Journal of Theoretical Biology*, 157: 203-220, 1992.

Kiszewski, A.E., Awerbuch, T.E., Sandberg, S., and Spielman, A., Sexually regulated fertility of ticks -- a conceptual model. *Proceedings of the First International Conference on Tick-Borne Pathogens at the Host-Vector Interface* 328-334, 1992.

Donnelly, C., Leisenring, W., Sandberg, S., Kanki, P. and Awerbuch, T.E., Comparison of transmission rates of HIV1 and HIV2 in a cohort of prostitutes in Senegal. *Bulletin of Mathematical Biology*, 55: 731-743, 1993.

Awerbuch, T.E. and Sandberg, S., Models for sexual and intravenous transmission of HIV. *Mathematical Modeling and Scientific Computing*, 2: 642-649, 1993.

Sandberg, S., and Awerbuch, T.E., A modification of Leslie matrices for the life cycle of the Lyme disease tick. *Mathematical Modeling and Scientific Computing*, 2: 667-672, 1993.

Awerbuch, T.E. and Spielman, A. Host density and tick dynamics: the case of the vector of Lyme disease. In: Perry and Hansen (eds.) *Modeling Vector and Other Parasitic Diseases*. Nairobi Kenya: ILRAD 1994, 51-65.

Levins, R., Awerbuch, T.E., Brinkman, U.Eckardt, I., Epstein, P., Makhaoul, N., Possas, C.A., Puccia, C., Spielman, A., and Wilson, M., Preparing for new diseases. *American Scientist*, 82: 52-60, 1994.

Awerbuch, T.E. and Spielman, A., Role of host density in the ecology of Lyme disease. Axford, J.S., and Reese, D.H. (eds.)Lyme Borreliosis. London: Plenum Press, 1994, 139-146.

Rothberg, M., Sandberg, S., and Awerbuch, T.E., Educational software for simulating risk of HIV infection. *Journal of Science Education and Technology*, 3: 64-70, 1994.

Puccia, C.J., Awerbuch, T.E., and Levins, R., Modeling strategy for new and resurgent diseases. In: Wilson, Levins, and Spielman (eds.) *Disease in Evolution*. New York: New York Academy of Sciences, 1994, 225-231.

Awerbuch, T.E., Evolution of mathematical models of epidemics. In: Wilson, Levins, and Spielman (eds.) *Disease in Evolution*. New York: New York Academy of Sciences, 1994, 232-241.

Levins, R., Awerbuch, T.E., Brinkman, U.,Eckardt, I., Epstein, P., Ford, T., Makhaoul, N., Possas, C.A., Puccia, C., Spielman, A., and Wilson, M., New and resurgent diseases; the failure of attempted eradication. *The Ecologist*, 25: 21-26, 1995.

Awerbuch, T.E., and Sandberg, S., Trends and oscillations in tick population dynamics *Journal of Theoretical Biology*, 175: 511-516, 1995.

Sandberg, S., Awerbuch, T.E., and Gonin, R., Simplicity vs. complexity in deterministic models: an application to AIDS data. *Journal of Biological Systems*, 4: 61-81, 1996.

Awerbuch, T.E., Brinkman, U.,Eckardt, I., Epstein, P., Ford, T., Levins, R., Makhaoul, N., Possas, C.A., Puccia, C., Spielman, A., and Wilson, M., Globalization, development, and the spread of disease. In: Goldsmith and Mander (eds.) *The Case Against the Global Economy*, Sierra Club Books, 1996, 160--170.

Kiszewski, A., Awerbuch, T.E., Sandberg, S., and Spielman, A.,A cellular automata model for exploring the relation between sexual behavior and fertility of ticks. *The Journal of Biological Systems*, 5: 203--213, 1997.

Awerbuch, T.E., Bader, K., Greenblatt, C., Ecological Continuum and Disease Transmission across Political Borders between Israel and its Neighbors. *Proceedings of the Fourth Nordic Conference on Middle Eastern Studies: The Middle East in a Globalized World*, Oslo, 1998.

Bader, K., Awerbuch, T.E., Greenblatt, C., Reemergence of rabies in Israel and the West Bank: the role of the fox. *Infectious Disease Review*, 20-29, 1999.

Awerbuch T, Kiszewski A. and Levins R., Surprise, Nonlinearity and Complex Behavior. In-- *Health Impacts of Global Environmental Change: Concepts and Methods*; Martens and Mcmichael (eds), 96-102, 2002

Karpati A., Galea S., Awerbuch T., and Levins R. Variability and vulnerability at the ecological level: Implications for understanding the social determinants of health *American Journal of Public Health*, 92:1768- 1772, 2002.

Awerbuch, T.E., Gonzalez, C., Hernandez, D., Sibat, R., Tapia, J.L., Levins, R., and Sandberg S., The natural control of the scale insect *Lepidosaphes gloverii on* Cuban citrus. Inter American Citrus Network newsletter No21/22, July 2004.

Awerbuch-Friedlander T., Levins R. and Predescu M., The Role of Seasonality in the Dynamics of Deer Tick Populations. *Bulletin of Mathematical Biology*; 67(3):467-486. 2005.

Awerbuch-Friedlander T., Disease dynamics across political borders: The Case Of Rabies in Israel and the Surrounding Countries. *Dynamis. Acta Hist. Med. Sci. Hist. Illus. 25, 451-486.*, 2005.

Predescu M., Levins R. and Awerbuch-Friedlander T.E., Analysis of non-linear System of Difference Equations Linking Mosquito Breeding Sites and Community Intervention, *Discrete and Continuous Dynamical Systems, Ser**B***. 6(3)605-622, 2006.

Predescu M, Sirbu R., Levins R., and Awerbuch-Friedlander T., On the Dynamics of a Deterministic and Stochastic Model for Mosquito Control. *Applied Mathematics Letters*, (20), 919-925, 2008

Awerbuch-Friedlander T., Camouzis E., Grove E., Ladas G., Levins R. and Predescu M. A non-linear system of difference equations, linking mosquitoes, habitats and community interventions. *Communications in applied non-linear analysis* 15: 77-88, 2008.

Kumarapeli V, Awerbuch-Friedlander T Human rabies focusing on dog ecology-A challenge to public health in Sri Lanka. *Acta Tropica.* 112:33-7, 2009.

Awerbuch-Friedlander T., Levins R. and Predescu M. Co-dynamics of consciousness and populations of the dengue vector in a spraying interventions system modeled by difference equations. *Far East Journal of Applied Mathematics* 37, 2: 215-228, 2009

Kiszewski Anthony E. and Awerbuch Tamara; The Effect of Patchy Host Distribution on the Dynamics and Persistence of Directly-Transmitted Pathogens: A Cellular Automata Study,"*Applied Mathematics*, 4:, 68-76, 2013,

Factor Roni, Awerbuch-Friedlander Tamara and Levins Richard, Social and Land Use Composition Determinants of Health: The Case of Health Indicators Variability. *Health and Place*, 22: 90-97, 2013

Awerbuch-Friedlander T., Gonzalez C., Hernandez D., Levins L., Sandberg S.,Sibat J. R. & Tapia J. L. Dynamics of the Scale and Its Natural Enemies in a Citrus Grove at Ceiba, Cuba. *Journal of Agricultural Sciences.* 5: 6-21, 2013

Levins R., Awerbuch T., Hyung Park, Managing Populations with Unimodal Dynamics, *Applied Mathematics* 4, 85-91, 2013

Awerbuch-Friedlander T, Predescu M. and Levins R, Co-Dynamics of Four Variables Involved in Dengue Transmission and its Control by Community Intervention: A System of Four Difference Equations. *Discrete Models in Nature and Society.* Volume 2014 (2014), 1 -8. http://dx.doi.org/10.1155/2014/101965

Shao-Chiu Juan, Tamara Awerbuch-Friedlander, Richard Levins, Socio-economic determinants of health in Taiwan: a study of eco-vulnerability. *Submitted to BMC Public Health.2014*

Miller Arnold, Shore Stephen, Awerbuch Tamara, Rankin Neil, Prognostic implications of atypical behaviors in children with autism spectrum disorder treated with cognitive-developmental systems, Submitted to *Scandinavian Journal of Psychology, 2014*

Kushmaro Ariel, Awerbuch-Friedlander Tamara and Levins Richard, Linking Ecology and Epidemiology of WNV through the Basic Reproductive Number: a comparison of Endemic vs. New Emergence Regions. Submitted to *Ecological Modeling* 2014.

Abstracts and Reports:

Baker, R.M., O'Brien, W., Hirshberg, C., Spencer, L., Awerbuch, T.E., and Weisman, T.O., Selection of CHO cells with reduced carbohydrate incorporation by means of 3H-mannose suicide. *Journal of Cell Biology*, 83 \#2, 1979.

Hirshberg, C.B., Baker, R.M., Spencer, L.A., Watson, D., Awerbuch, T.E., and Perez, M., Selection of mutant CHO cells altered in glycoproteins by means of tritiated fucose suicide. *Federation Proceedings*, 39 \#6, 200, 1980.

Awerbuch, T.E., Threshold mutagenic concentration of chemical carcinogens. Journal of Supramolecular Structure and Cellular Biochemistry, Supp. 5: 222, 1981.

Awerbuch, T.E., Determination of half-life times and mutagenic concentrations of chemical carcinogens via a quantitative analysis of diffusion bioassays. *Abstracts of the First European Biometric Conference*, Budapest, April 1985.

Awerbuch, T.E., and Ryder, E.F., A computerized method for determining stabilities and mutagenic concentrations of chemicals using a diffusion bioassay. *SIAM Institute for Mathematics and Society Technical Report* #21, 1987.

Feldman, H.A. and Awerbuch, T.E., Radial diffusion assays: a mathematical basis for statistical analysis and exposure modeling. *Proceedings of the IMACS World Congress on Scientific Computation*, Paris, 1988 (eds. R. Vichnevetsky, P. Borne, and J. Vignes). Vol. IV, pp. 113-116.

Shtarkshall, R.A. and Awerbuch, T.E., It takes two to tango but one to infect. *Abstracts of the International Conference on AIDS*, June 4-9, 1989, p.1052.

Romieu, I., Sandberg, S., Awerbuch, T.E., Mohar, A., Valdespino, J.L., et al., Modeling of the AIDS epidemic in Mexico. *Abstracts of the International Conference on AIDS*, June 4-9, 1989, p.154.

Donnelly, C.A., Leisenring, W.N., Sandberg, S., Kanki, P.J., and Awerbuch, T.E., Comparison of transmission rates of HIV1 and HIV2 in a cohort of prostitues in Senegal. *Abstracts of the 40th Annual Meeting of the American Society of Tropical Medicine and Hygiene*. December 1-5, 1991, p.103.

Awerbuch, T.E., Sandberg, S., and Spielman, A., Critical abundance of hosts perpetuating the tick that transmits the agent of Lyme disease. *Abstracts of the 40th Annual Meeting of the American Society of Tropical Medicine and Hygiene*, December 1-5, 1991, p.205.

Heuschkel, C., and Awerbuch, T.E., A model for the seasonal transmission of {\it Dracunculiasis} in a rural community. *Abstracts of the 40th Annual Meeting of the American Society of Tropical Medicine and Hygiene*, December 1-5, 1991, p.123.

Leisenring, W.N., Donnelly, C., Sandberg, S., Kanki, P., and Awerbuch, T.E., Decreased infectivity of HIV2 compared to HIV1: a mathematical model. Abstracts of the VIII *International Conference on AIDS/III STDWorld Congress*, July 19-24, 1992.

Kanki, P., Leisenring, W.N., Donnelly, C., Sandberg, S., and Awerbuch, T.E., Decreased infectivity of HIV2 compared to HIV1: a mathematical model. *Annual Meeting sponsored by the Laboratory of Tumor Cell Biology NIH*, August 6-15, 1992.

Awerbuch, T.E., Geshnizgani, A., Ross, R., and Onderdonk, A., Growth rates for lactobacillus acidophilus. *Abstracts of General Meeting of the American Society of Microbiology*, May 26-30, 1992. Abstract #186.

Awerbuch, T.E., Sandberg, S., Telford III, S.R., and Spielman,A., The effect of mouse abundance on the density of the vector of Lyme disease. *Abstracts of the V International Conference on Lyme disease*, May 30-June 2, 1992. Abstract #304, p.A52.

Awerbuch, T.E., Sandberg, S., Deblinger, R., and Spielman, A., Effect of simulated deer reduction on the abundance of thevector of Lyme disease. *Abstracts of the 41st Annual Meeting of the American Society of Tropical Medicine and Hygiene*, November 1992, p.214.

Avila, C., Awerbuch, T.E., and Sandberg, S., A model for projecting pediatric AIDS in Latin America. *Abstracts of the IXth International Conference on AIDS*, Berlin, June 1993.

Levins, R., Possas, C.A., Awerbuch, T.E., Brinkman, U.,Eckardt, I., Epstein, P., Makhaoul, N., Puccia, C., Spielman, A., and Wilson, M., Preparing for new infectious diseases. *Working paper #8*, Department of Population and International Health, Harvard School of Public Health.

Komar, N., Awerbuch, T.E., Levins, R., and Spielman, A., Critical host and vector densities for epidemic transmission of Eastern Encephalitis virus:A model. *Proceedings of the 81st Annual Meeting of the New Jersey Mosquito Control Association*, Atlantic City, New Jersey, March 1994.

Rothberg, M., Sandberg, S., and Awerbuch, T.E., Promoting sexual decisions to reduce the risk of HIV infection with simulation software. *Abstracts of the International Conference on AIDS*, Tokyo,Japan, August 7--12, 1994. Abstract #PD0699.

Awerbuch, T.E., Rothberg, M, and Sandberg, S., Personalizing the effect of behavior on risk of HIV transmission via computer simulation. *Abstracts of the International Conference on AIDS Education*. Jerusalem, Israel,November 1995. p.20.

Bader, K., Hassouneh, V.A., Abdeen, Greenblatt C., Awerbuch T.E., and Richter, E., Rabies control in the Nablus district: ecological and epidemiological trends. *Proceedings of the International Conference on Communicable Disease as Occupational Hazard*, Jerusalem, Israel, March 1996.

Awerbuch, T.E., and Kiszewski, A, The spread of infectious disease in a patchy environment. *Proceedings of the European Conference onTheory and Mathematics in Biology and Medecine*, Amsterdam, The Netherlands, June 28--July 3, 1998.

Awerbuch, T.E., Gonzalez, C., Hernandez, D., Sibat, R., Tapia, J.L., Levins, R.,

and Sandberg S., Dynamics of the scale and its natural enemies in a citrus grove at Ceiba, Cuba. *Proceedings of the XIVth International Plant Protection Conference*, Jersualem, Israel, July 25--30, 1999.

Awerbuch T. Peaceful Cooperation for Controlling Infectious Diseases on Israel and the Surrounding Countries. *Resumenes de Ponencia del VI Seminario Internacional, Paz, Recursos Naturales y Sociedad*, Havana, Cuba, 2002 Mar 27-29

Awerbuch T., Galea S., Karpati A. and and Levins R. Ecology of Health: Vulnerability as Variability . *Abstracts of the 2nd International Conference of The International Society for Equity and Health*, Toronto, Canada, June 14-16, 2002.

Rehkopf David, Furumoto-Dawson A., Kiszewski A, Awerbuch T, Modeling the spread of Tuberculosis: a Cellular Automata model. *Abstracts of the 2nd International conference on Urban Health. Oct 16-19,2003,*

Ariel Kushmaro , Tamara Awerbuch and Richard Levins, Basic Reproductive Number for West Nile Virus in Endemic and New Emergence Regions. *Abstract of the Conference on WNV, Israel , May 2004.*

Tamara Awerbuch and Richard Levins. Individual and Community Dynamics in Controling Dengue. *Abstracts of the II International Congress on Dengue and Yellow Fever Havana, Cuba, 31 May-3 June 2004*

Ariel Kushmaro, Barak Epshtein, Tamara Awerbuch-Friedlander, Modeling the ecological impact on vectors and reservoir of the West Nile Virus. *Abstract of The Second Jerusalem Symposium on Arthropod-Borne Viral Diseases June26-29,2006.*

Tamara Awerbuch-Friedlander, Complexity along Historical Pathways: Failures and Successes of Attempted Eradication of Infectious Diseases in Israel and the Surrounding Countries-the 20th Century. Abstract of the *40th Anniversary Meeting of the Middle East Studies Association of North America (MESA). November 18-21, 2006*

Tamara Awerbuch-Friedlander, Trends and oscillations in the dynamics of linear vs. non-linear difference equation models describing populations., Abstract of the lecture on *Difference Equations and Applicatios for the American Society of Mathematics, Washington, January 5, 2009.*

Tamara Awerbuch Friedlander, Mihaela Predescu and Richard Levins, : The Dynamic of Consciousness in Epidemiology: The case of Dengue. Abstract of the lecture for *Salud, International Conference in Public Health***;** Havana, Cuba, *December 2-3, 2012*

Tamara Awerbuch Friedlander *Workshop on Mathematics of Planet Earth: Models and Methods in Ecology and Epidemiology:* Invited papers: Abstract: 1) Lyme disease spread

in the Context of a Complex Ecology: Emergence, Seasonality and Global Warming; Models with Difference Equations. Abstract: 2) Dynamics of a pest and its Natural Enemies in a Citrus Grove in Cuba. CRM, Department of Mathematics, University of Montreal, Montreal. Canada. February 13-15, 2013

Tamara Awerbuch Friedlander . *8th Annual International Conference on Mathematics & Statistics: Education & Applications*, Abstract: *Teaching the analysis of COMPLEX SYSTEMS as a Problem Oriented Approach: Mathematical Models in Biology and Public Health, ,* Athens, Greece. 30 June & 1-3 July 2013

Tamara Awerbuch Friedlander The *20th International Conference on difference Equations and Applications*. Abstract: Co-Dynamics of Variables Involved in Dengue Transmission by Mosquitoes, and its Control: A System of Four Difference Equations. Wuhan, China. July 21 - 25, 2014 .