

# Curriculum Vitae of Tom Ray

## Personal Information:

Department of Biology, University of Oklahoma, Norman, Oklahoma 73019  
(405) 579-7211, tray@ou.edu, <http://life.ou.edu/>

Born: September 21, 1954, Norman, Oklahoma, USA

## Education:

Florida State University (FSU) 1971--1976. BS Magna Cum Laude in Biology and Chemistry  
1976

Harvard University Biology Department, 1976--1981. A.M. 1980, Ph.D. 1981, in Biology

## Languages

Fluency in English, Spanish, Perl, C, C++, and Visual C++; Intermediate Japanese

## Grants

NSF : CI TEAM Demonstration: Scalable Cyberinfrastructure for Bioinformatics and Beyond,  
2006, \$249,974;

National Institute on Drug Abuse Drugs Supply Program: Multi-receptor structure activity  
relationships of hallucinogens, 2004, drugs transferred directly to NIMH-PDSP;

ATR Human Information Sciences Labs: Post-Genomic Approaches to the Human Mind, 2003-4,  
\$18,340.21;

Oklahoma Biomedical Research Infrastructure Network: Bioinformatics Core, 2003, three flow-  
through grants: 2003 \$7,535, 2004 \$15,169, 2005 \$4,384;

College of Arts and Sciences Instructional Computing Grants: Teaching Facility for Bioinformatics  
Degree Program, 2003, \$29,228.55;

ATR Human Information Sciences Labs: Post-Genomic Approaches to the Human Mind, 2002-3,  
\$41,031;

National Institute on Drug Abuse Drugs Supply Program: Multi-receptor structure activity  
relationships of hallucinogens, 2002, drugs supplied directly to NIMH-PDSP;

National Institute of Mental Health, Psychoactive Drug Screening Program: Multi-  
receptor structure activity relationships of hallucinogens, 2002, no cash value;

ATR Human Information Sciences Labs: Bioinformatic Approach to the Human Mind, 2001-2,  
\$37,322;

Greenview Fund: Bioinformatic Study of the Evolution of Gene Families, 2001, \$170,000;

Nippon Telegraph and Telephone Corporation: Evolved Virtual Creatures, 2000, \$72,104.55;

Nippon Telegraph and Telephone Corporation: Evolved Virtual Creatures, 1999, \$91,954.02;

Santa Fe Institute: support for Evolvability Working Group, April 2000, \$10,100;

Silicon Graphics Inc.: Vanguards of Visual Computing equipment grant, 1998, grant of two SGI workstations;  
Santa Fe Institute: support for Tierra Workshop, 1996;  
Microsoft: support for Tierra Workshop, 1996;  
NASA Ames Research Center: support for Tierra Workshop, 1996;  
Sun Microsystems: support for Tierra Workshop, 1995, 1996;  
Santa Fe Institute: support for Tierra Workshop, 1995;  
The Rex Foundation: Network-wide Biodiversity Reserve for Digital Organisms, 1994;  
The John D. and Catherine T. MacArthur Foundation: rain forest conservation project, 1994;  
National Fish and Wildlife Foundation: rain forest conservation project, 1994;  
Thinking Machines Corporation, 1993;  
NSF Computational Biology Program: Evolution of Digital Organisms, 1993;  
NSF Computer Systems Architectures & Computational Biology Programs:  
Computer Architectures for the Natural Evolution of Machine Code, 1992;  
Digital Equipment Corporation, Semiconductor Engineering Group, 1992;  
Thinking Machines Corporation, 1992; IBM, T. J. Watson Research Center, 1992;  
Hughes Aircraft, 1992;  
U of D Center for Teaching Effectiveness, to develop new course, Computers in Biological Research, 1989;  
National Center for Supercomputing Applications (NSF funded) support for computers in Biological Research, 1989, 1991;  
NSF Systematic Biology Program: Morphometric and phylogenetic studies of shoot development in the Araceae, 1989;  
NSF support for participation in the Morphometrics in Systematic Biology workshop, 1988;  
Botanical Society of America travel grant to International Botanical Congress, 1987;  
University of Delaware Research Foundation grant, 1984;  
Atkins Fund of Harvard, 1979;  
Barbour Fund of the Harvard Museum of Comparative Zoology, 1978;  
Sigma Xi, 1978;  
RIAS grant from the Organization for Tropical Studies, 1977;  
Anderson Fund of Harvard, 1977;  
Atkins Fund of Harvard, 1977

## **Fellowships**

Michigan Fellow, starting September 1981;  
Jessie Smith Noyes Fellowship, 1981;  
National Institute of Health Training Grant, 1 year starting September 1980;  
NSF 3 year Predoctoral Fellowship, starting October 1976;  
Informal fellowship from FSU Chemistry Dept. for tuition in fifth year at FSU, 1975--1976

## **Awards**

ATR Distinguished Research & Development Award, 1997;  
Japan Inter-Design Forum 1995 Grand Prix;

Digital Vanguard Award, Arc Awards at the 1995 Interactive Media Festival;  
Winner of 1990 IBM Supercomputing Competition, \$15,000 prize, 1991;  
Bowdoin Prize for Essays in the Natural Sciences, Harvard, 1978;  
Merck Award in Chemistry, FSU, 1976;  
Chosen outstanding senior at FSU by Phi Beta Kappa, 1975

## Honors

Elected American Association for the Advancement of Science (AAAS) Fellow 2002; A species of plant, *Syngonium rayi*, named in honor of, 1997; Phi Eta Sigma 1972; Phi Beta Kappa 1974; Phi Kappa Phi 1974; Omicron Delta Kappa 1975; Honors in Biology

## Positions Held

Adjunct Professor of Computer Science, University of Oklahoma, January 2000 to present.

Supervisor (Invited Researcher), ATR Human Information Processing Research Laboratories, January 4, 1999 to February 28, 2001.

Professor, Department of Zoology (now Biology), University of Oklahoma, August 1998 to present.

Member of the External Faculty of the Santa Fe Institute, November 1993 to 2003.

Invited Researcher, ATR (Advanced Telecommunications Research Institute International) Human Information Processing Research Laboratories, August 1993 to August 1998.

Associate Professor, University of Delaware, Computer and Information Sciences, January 1993 to August 1998.

Visiting professor at Department D'Informatique, Ecole Polytechnique Federale de Lausanne, Switzerland, October 1, 1996 to November 13, 1996.

Consultant, Inter-American Development Bank, January - July 1993.

Visiting Professor, Santa Fe Institute, July 1991; Feb. -- Aug. 1992;

Associate Professor, University of Delaware, Biology Department, September 1990 to August 1998.

Assistant Professor, University of Delaware, Biology Department, September 1981 to August 1990.

Owner and operator, Finca El Bejuco Biological Station, Costa Rica, 1982 to present.

Director of University of Delaware's Semester in Costa Rica Program, Spring 1988.

Michigan Fellow, July 1981 to June 1982

Field Assistant to Dr. E. O. Wilson, 8/1978--8/1979, 12/1979--1/1980 and 12/1980--1/1981

Station Manager for Finca La Selva, August 1978 to August 1979

Organizer and Host of the weekly “Society for Expeditionary Biology” seminar series, held in the Harvard Biological Laboratories spring 1978, 1979--1980, & 1980--1981

Visiting Scientist on summer of 1977 OTS course

Research Assistant to Dr. Donald Strong at Finca La Selva, summers of 1974--1976

Assistant to Dr. Daniel Simberloff 1973—75

Environmental Consultant to FSU Department of Physical Planning 1972

## **License**

Oklahoma State Bureau of Narcotics and Dangerous Drugs Control (30733)

## **Upcoming Research Lectures**

### **Past Research Lectures**

“Clinical Studies of Mental Organs”, Pharmacological Approaches to the Human Mind – Looking Forward. University of Oklahoma, Biology, August 25, 2016. Symposium.

“Mental Organs”. Norman Naturalism group, June 26, 2016. <http://www.meetup.com/naturalism-6/events/231875973/>

Ray, T., Speaker Series, “The Human Mind,” Secular Sooners, 180-181 David L. Boren Hall, OU. (November 18, 2015). Lecture, Seminar.

Ray, T., Forum on Adaptable Systems, Center for the Philosophy of Freedom, Biosphere 2, Oracle, AZ. (October 15, 2015). Oral Presentation, Workshop.

Ray, T., Steve Reynolds Talk Show, “Chemical Architecture of the Human Mind,” Opolis, Norman. (January 31, 2015). Oral Presentation, Talk Show.

“Reason and Other Ways of Knowing: Our Evolutionary Heritage”. Norman Naturalism group, September 17, 2011. [http://www.normannaturalism.org/events/31332502/t/ea1.2\\_grp/?rv=ea1.2](http://www.normannaturalism.org/events/31332502/t/ea1.2_grp/?rv=ea1.2)

“Reason and Other Ways of Knowing: Our Evolutionary Heritage”. Transcultural Tendencies Transmedial Transactions, Shanghai Institute of Visual Art (by skype). August 26-27, 2011. <http://ttt.artlinkart.com/en/>

“Reason and Other Ways of Knowing: Our Evolutionary Heritage”. Second Dynasty Foundation Popular Science Festival, Moscow, March 23 - April 30, 2011. <http://www.dynastyfdn.ru>, <http://elementy.ru/festival2011>

“Family Size”. Animal Volunteer Alliance. University of Oklahoma, September 22, 2010. <http://www.ou.edu/ava/>, <http://www.facebook.com/ouava>

“Ways of Knowing”. Ashtanga Yoga Studio. Norman Oklahoma, September 1, 2010. <http://www.ashtangayogastudio.com/>

“Evolution of the Human Mind”. Darwinathon. University of Oklahoma. November 2, 2009. <http://www.ou.edu/darwin/Site/Darwinathon.html>

“Duality, Nonduality, and Neurotransmitter Receptor Systems” (plenary lecture). Science and Nonduality Conference, October 21-25, 2009. San Rafael, California. <http://www.scienceandnonduality.com/>

“The Human Mind” (workshop). Science and Nonduality Conference, October 21-25, 2009. San Rafael, California. <http://www.scienceandnonduality.com/>

“The Human Mind”. J. Craig Venter Institute, <http://www.jcvi.org/>. September 30, 2009. Rockville, MD.

“The Human Mind”. ALife 2009. IEEE Symposium Series on Computational Intelligence 2009. Nashville, Tennessee, March 30 – April 2, 2009. <http://www.ieee-ssci.org/index.php?q=node/11>, [http://homepages.feis.herts.ac.uk/~comqcln/IEEE\\_ALIFE\\_2009.html](http://homepages.feis.herts.ac.uk/~comqcln/IEEE_ALIFE_2009.html)

“Evolution of the Mind”. Ecomunch, University of Oklahoma. November 2008.

“The Chemical Architecture of the Mind”. Toward a Science of Consciousness 2008. April 2008, Tucson Arizona. <http://www.consciousness.arizona.edu/tucson2008.htm>

“The Chemical Architecture of the Mind”. Neuromunch, University of Oklahoma. April 4, 2008.

Biomimetics International Conference, Doshisha University, Kyoto Japan, December 2, 2006, contact: [kkano@mail.doshisha.ac.jp](mailto:kkano@mail.doshisha.ac.jp), <http://www1.doshisha.ac.jp/~kkano/BMRC/index4.htm>

The Chemical Architecture of the Human Mind: Probing Receptor Space with Psychedelics. Toward a Science of Consciousness 2004, April 7-11, 2004, Tucson Arizona. <http://life.ou.edu/pubs/Tucson04/>

Approaching the Human Mind Through the Genome. Technology Transfer Institute Vanguard Conference, "Rearranging the Atoms", April 23-34, 2002, Toronto Canada.

Evolution in the Digital Medium. George Lynn Cross Lecture in Biology, The Department of Botany and Microbiology, University of Oklahoma, November 27, 2000, Norman, Oklahoma.

A Wildlife Reserve in Cyberspace. [Future Screen 00 Artificial Life: Hardware, Software, Wetware](#) October 27-29, 2000, Sydney, Australia. At the Powerhouse Museum. Presentation by telepresence.

Honors Faculty Forum, "New Approaches to Complex Adaptive Systems in Biology, Economics, and Philosophy", University of Oklahoma, October 11, 2000, Norman Oklahoma, presented together with Mark Bedau.

[Seminar on Emulation](#) September 1-3, 2000, Amsterdam, Netherlands. Sponsored by [Mediamatic Magazine](#) and [Amsterdam Summer University](#). Presentation by telepresence.

Tierra Tutorial. Artificial Life VII, The Seventh International Conference on the Simulation and Synthesis of Living Systems, August 1-6, 2000. Reed College, Portland

Aesthetically Evolved Virtual Pets. Artificial Life VII, The Seventh International Conference on the Simulation and Synthesis of Living Systems, August 1-6, 2000. Reed College, Portland Oregon. Presented twice, in two workshops: "Artificial Life in Art, Design, and Entertainment" and "Coevolution of Brains and Bodies".

Artificial Life: The Big Questions. Round Table Discussion. Artificial Life VII, The Seventh International Conference on the Simulation and Synthesis of Living Systems, August 1-6, 2000. Reed College, Portland

Evolution of Differentiation in Multi-threaded Digital Organisms. Artificial Life VII, The Seventh International Conference on the Simulation and Synthesis of Living Systems, August 1-6, 2000. Reed College, Portland Oregon

Aesthetically Evolved Virtual Creatures. Sony CSL. July 28, 2000. Tokyo, Japan

Measures of Evolvability in Tierra. Working Group on Evolvability, Santa Fe Institute, April 6-9, 2000. Contact: Tom Ray ([tray@ou.edu](mailto:tray@ou.edu))

Measures of Evolvability in Tierra. Artificial Life and Robotics, <http://arob.cc.oita-u.ac.jp/>, January 26-28, 2000. Oita, Japan. Measures of Evolvability in Tierra. Contact: AROB Secretariat [arobsecr@cc.oita-u.ac.jp](mailto:arobsecr@cc.oita-u.ac.jp))

Evolution in the Digital Medium. Santa Fe Institute "Tutorial on Complexity", January 24-25, 2000. Tokyo, Japan. Evolution in the Digital Medium. Contact: Suzanne Dulle ([suzanne@santafe.edu](mailto:suzanne@santafe.edu))

Digital Biota 3/OWorld Open Source Virtual Worlds Conference,  
<http://oworld.hitl.washington.edu/>, Sun Microsystems, Palo Alto, CA, November 6-7, 1999.  
Contact: Bruce Damer ([bdamer@ccon.org](mailto:bdamer@ccon.org))

1999 Beckman Symposium, Beckman Research Institute of the City of Hope, November 6, 1999.  
Contact: Steven Smith ([ssmith@coh.org](mailto:ssmith@coh.org))

'99 IROS (Intelligent Robot and Systems), <http://iros99.kaist.ac.kr>, in Kyongju, Korea, October 17 through 21, 1999. Contact: Ju-Jang Lee, Program Chair, IEEE, IROS'99 ([jjlee@ee.kaist.ac.kr](mailto:jjlee@ee.kaist.ac.kr))

Department of Biology and Biochemistry, University of Houston, October 6, 1999. Contact: Anne Delcour ([ADelcour@uh.edu](mailto:ADelcour@uh.edu))

Oklahoma School of Science and Math, Oklahoma City, September 23, 1999. Contact: Judy Markley ([jmarkley@ossm.edu](mailto:jmarkley@ossm.edu))

Physics Department, Washington University, St. Louis Missouri, September 15, 1999. Contact: Carl Bender ([cmb@howdy.wustl.edu](mailto:cmb@howdy.wustl.edu))

Navigating Intelligence, The Banff New Media Institute, <http://www.banffcentre.ab.ca/nmi>, The Banff Centre for the Arts, Banff Canada, September 9-12, 1999. Contact: Susan Kennard ([susan@banff.org](mailto:susan@banff.org))

GECCO (Genetic and Evolutionary Computation Conference),  
<http://www.illigal.ge.uiuc.edu/gecco/>, Orlando, Florida, July 13-17, 1999.

Invited Researcher, ATR Human Information Processing Research Laboratories, Kyoto, Japan, mid May to mid August 1999. Lecture on Evolvability, August 12, 1999. Contact: Keiko Murakami ([keiko@hip.atr.co.jp](mailto:keiko@hip.atr.co.jp))

Nichols Hills Methodist Church, Oklahoma City, May 1, 1999. Contact: Russ alker ([rjwalker@walkerandwalker.com](mailto:rjwalker@walkerandwalker.com))

Chaos in Manufacturing, Radisson Hotel, Santa Fe, New Mexico, April 13-16, 1999. Contact: Bob DeSimone ([BobD45@aol.com](mailto:BobD45@aol.com))

Electrical & Computer Engineering, University of Oklahoma, Norman, Oklahoma, March 25, 1999. Contact: Hazem Hejjo ([Hazem@ou.edu](mailto:Hazem@ou.edu))

Health Science Center, Pathology Department, University of Oklahoma, February 12, 1999.  
Contact: Fred Silva (405) 271-2422

Physics Colloquium, University of Oklahoma, January 28, 1999. Contact: Kieran Mullen ([kieran@phyast.nhn.ou.edu](mailto:kieran@phyast.nhn.ou.edu))

AROB (Artificial Life and Robotics) IV '99, <http://AROB.cc.oita-u.ac.jp/>, January 19-21, 1999. B-Con Plaza, Beppu. Contact: Masanori Sugisaka [msugi@cc.oita-u.ac.jp](mailto:msugi@cc.oita-u.ac.jp))

Symposium on Complexity, Complexity Group for Medical Science, January 18, 1999, KAST Main Hall, Seoul KOREA. Contact: Prof Hongkyu Lee & Self, Alexander D. Shin, MD, corresponding manager, CGMS ([minddr@medicine.snu.ac.kr](mailto:minddr@medicine.snu.ac.kr))

KAIST (Korea Advanced Institute of Science and Technology), Taejoun, Korea. 10:00, January 17, 1999. Contact: Prof Soo-Young Kim ([sykim@sensor.kaist.ac.kr](mailto:sykim@sensor.kaist.ac.kr))

Dept. of Computer Science, Yonsei University, 134 Shinchon-dong, Sudaemoon-ku, Seoul 120-749, Korea, January 16, 1999 Contact: Prof Sung-Bae Cho ([sbcho@csai.yonsei.ac.kr](mailto:sbcho@csai.yonsei.ac.kr))

Phi Beta Kappa, University of Oklahoma, November 23, 1998. Contact: Pat Gilman 405-364-6974.

The Age of Spiritual Machines, at the Gilder/Forbes Telecosm conference, <http://www.forbes.com/conf/telecosm/> September 15-17, 1998 in Lake Tahoe, USA.

Digital Biota 2, <http://www.cyberbiology.org/> The Second Annual Conference on Cyberbiology, September 10-13, 1998, Cambridge, UK.

British Telecom, <http://www.labs.bt.com/> September 9, 1998.

ALife VI, Sixth International Conference on Artificial Life, Life and Computation: the Boundaries are Changing, <http://alife6.alife.org/>, University of California, Los Angeles June 26-29, 1998. Contact: [alife6@alife.org](mailto:alife6@alife.org)

Summer School on Environmental Dynamics, Istituto Veneto di Scienze, Lettere ed Arti, <http://www.ivsla.unive.it>, Venice Italy, June 16-26, 1998. Contact: Prof. Andrea Rinaldo ([rinaldo@idra.unipd.it](mailto:rinaldo@idra.unipd.it))

Bogazici University, <http://www.boun.edu.tr/>, Istanbul Turkey, June 9-15, 1998. Contact: Umur Ozkul ([Umur@WriteMe.com](mailto:Umur@WriteMe.com), [UOzkul@iltekmedia.com](mailto:UOzkul@iltekmedia.com))

Institute of Systems Science, Chinese Academy of Sciences, Beijing, China, April 6-11, 1998. Contact: Yongguang Zhang ([y Zhang@iss01.iss.ac.cn](mailto:y Zhang@iss01.iss.ac.cn), [ygzhang@china.kw.com.cn](mailto:ygzhang@china.kw.com.cn))

AROB (Artificial Life and Robotics) III '98, January 19-21, 1998. B-Con Plaza, Beppu. Contact: Masanori Sugisaka ([msugi@cc.oita-u.ac.jp](mailto:msugi@cc.oita-u.ac.jp)) <http://AROB.cc.oita-u.ac.jp/>

National Center for High Speed Computation, Taiwan, December 18, 1997. Contact: Su Zheng-yao ([c00zsu00@nchc.gov.tw](mailto:c00zsu00@nchc.gov.tw))

National Taiwan University, Taiwan, December 19, 1997. Contacts: YC Chen ([ychen@phys.nthu.edu.tw](mailto:ychen@phys.nthu.edu.tw)), Chang Da-Wen ([chang@phys.nthu.edu.tw](mailto:chang@phys.nthu.edu.tw))



Academia Sinica, Institute of Medical Biology, Taiwan, December 19, 1997. Contact: Lan-Yang Chang (lychang@ibms.sinica.edu.tw)

Physics Department and Center for Complex Systems, National Central University, Chungli, Taiwan, December 21, 1997. Contact: H. C. Lee (hclee@sansan.phy.ncu.edu.tw)

What can Theoretical Physicists do in Biology, Center for Complex Systems, National Central University, Chungli, Taiwan, December 22-23, 1997. Contact: H. C. Lee (hclee@sansan.phy.ncu.edu.tw)

British Telecom, <http://www.labs.bt.com/>, December 1-2, 1997. Contact: Peter Cochrane (peter.cochrane@bt-sys.bt.co.uk)

The Institute for Futures Studies, Would-Be Worlds, Stockholm, Sweden, November 27, 1997. Contact: Joanna Rose (jr@fof.se)

Mathematical & Computational Biology Workshop, <http://www.u-aizu.ac.jp/MCB/>, University of Aizu, Japan, October 21-25, 1997. Contact: Chrystopher Nehaniv (nehaniv@u-aizu.ac.jp)

Zoology Department, University of Oklahoma, Norman, Oklahoma, September 29-30, 1997.

International Conference on Complex Systems, <http://necsi.org/html/iccs.html>, New England Complex Systems Institute, Nashua, New Hampshire, September 21-26, 1997.

Workshop: The Burgess Shale and the Digital Cambrian, <http://www.biota.org>, Banff, Alberta, Canada, August 29 - September 1, 1997.

Genetic Programming 1997 (GP97), <http://www-cs-faculty.stanford.edu/~koza/gp97.html>, Stanford University, July 13-16, 1997.

Zoology Department, University of Oklahoma, Norman, Oklahoma, July 9-12, 1997.

Opening Symposium - Towards the Museum of the Future – “Artificial Life and Artificial Intelligence / The Thinking Machine”, NTT/ICC - Intercommunication Center, <http://www.ntticc.or.jp/>, Tokyo Opera City Tower 4F, 3-20-2 Nishishinjuku, Shinjuku-ku, Tokyo 163-14, Japan, April 20, 1997.

Humankind - The Human Being, German Hygiene Museum (<http://www.dhmd.de>) Projekt EXPO 2000 (<http://www.expo2000.de>) Dresden, April 9-10, 1997.

AROB (Artificial Life and Robotics) '97, February 18-20, 1997. B-Con Plaza, Beppu. <http://seigyol.cc.oita-u.ac.jp/AROB/AROBHome.html>

The Form Behind the Form. Interdisciplinary Workshop at Danmarks Designskole. Copenhagen, Denmark. January 9, 1997.

Brain, Computer, Evolution. Ministry of Posts & Telecommunications. Kobe, Japan. December 9-10, 1996.

Mathematical Modeling and Problem Solving Study Group (MPS) of the Information Processing Society of Japan, "ALife Methodology and its Applications." <http://isw3.aist-nara.ac.jp/Misc/wide-area-map-ja.html> Nara Advanced Institute of Science & Technology (NAIST) November 26, 1996.

Kansai Section of the Information Processing Society of Japan, Seminar: "ALife and Evolutionary Systems", Chuo Denki Club, room 513 (Osaka), November 25, 1996,

Centre Suisse d'Electronique et de Microtechnique SA, Neuchatel, Switzerland. November 12, 1996.

Doors of Perception 4 'Speed' (<http://www.design-inst.nl/doors4/>), Netherlands Design Institute (<http://www.design-inst.nl/>), Amsterdam, Netherlands, November 7-8, 1996.

Department D'Informatique, Ecole Polytechnique Federale de Lausanne, Switzerland, November 5, 1996.

Cognitive Science "Brown Bags", AI Lab, Computer Science Department, University of Zurich, Switzerland, October 29, 1996.

School of Cognitive and Computing Sciences, University of Sussex, U.K., October 23-24, 1996.

Life in the infosphere, Munich, Germany, October 16, 1996.

Complex System Seminar, Osaka City University, Osaka, Japan, August 2, 1996.

Kyoto Conference on Mathematical Biology '96, June 9-13, 1996, Kyoto, Japan.

Artificial Life V, Nara, Japan, May 16-18, 1996

Public Lecture, Nara, Japan, May 15, 1996

Lectures on ALife, organized by IEEE Tokyo Section, Tokyo, Japan, May 10, 1996

International Workshop on Soft Computing in Industry (IWSCI'96), Muroran Institute of Technology, Muroran, Japan, April 27-28, 1996

Mind over Matter: Immaterial Design in the Age of Material Limits. A one-day event about the future of immaterial design. Louisiana Museum of Modern Art, Humlebaek, Denmark. April 19, 1996

Novo Nordisk, Copenhagen, Denmark, April 17, 1996

Aizu University, Aizu, Japan, April 3-4, 1996

Imagina: Intelligent Interaction, Monte-Carlo, Monaco, February 21-23, 1996

Artificial Life and Robotics, Oita, Japan, February 18-20, 1996

Santa Fe Institute, Tierra Workshop, February 2-4, 1996

Microsoft, Redmond, Washington, January 18, 1996

Santa Fe Institute, Ecomachines and Spatial Modeling in Ecology and Biology, January 13-16, 1996

Doors of Perception, Amsterdam, November 6-12, 1995

DEAF, Dutch Electronic Arts Festival, Rotterdam, November 24-26, 1995

Interactive Media Festival, Los Angeles, June 4-8, 1995

International Institute for Advanced Studies, Kyoto, Japan, May 28-30, 1995

Mainichi Symposia and Scientific Meeting 1995, Tokyo, May 12, 1995

Sony Computer Science Lab, Tokyo, May 11, 1995

Sanfa Fe Institute, March 24, 1995

Sun Microsystems, California, February 27, 1995

TED6 (Technology, Entertainment, Design), Monterey, CA, February 22--25, 1995

Princeton Plasma Physics Laboratory, Princeton, NJ, February 20, 1995

Haverford College, February 16-17, 1995

BIO Japan, Osaka, December 1, 1994

Honda Wako Research Center, Wako-city, Japan, November 16, 1994

Oracle, Redwood Shores, CA, October 25, 1994

Broderbund, Novato, CA, October 24, 1994

Bionomics Conference, San Francisco, October 21--22, 1994

Complex Systems Workshop, Research Institute for Fundamental Physics, University of Kyoto, October 5-7, 1994

Seminar on Neural Networks, Genetic Algorithms and Artificial Life; Systems Control and Information Society, Tokyo, Japan, October 4--5, 1994

Seminar on Neural Networks, Genetic Algorithms and Artificial Life; Systems Control and Information Society, Osaka, Japan, September 29--30, 1994

Osaka Education University, Osaka, Japan, September 26, 1994

Techno-park Festa, Sapporo, Japan, September 15, 1994

University of Hokkaido, Sapporo, Japan, September 14, 1994

From Perception to Action, Lausanne, Switzerland, September 5--9, 1994

InterCommunications Center, New School, Tokyo, Japan, September 3, 1994

International Institute for Advanced Study, Kansai Science City, August 22-24, 1994

RO-MAN '94, 3rd IEEE International Workshop on Robot and Human Communication, Nagoya, Japan, July 18-19, 1994

Sun Microsystems, Palo Alto, CA, July 12, 1994

AT&T Bell Labs, Murray Hill, NJ, July 11, 1994

Learning about Evolution, MIT Media Labs, Cambridge, MA, July 9, 1994

Artificial Life Conference, MIT, Cambridge, Massachusetts, July 6-8, 1994

Nanotechnology study group, MIT, Cambridge, MA July 5, 1994

Computer Aided Materials and Molecular Design, by Business Research Institute Inc., Shizuoka, Japan, July 1, 1994

Electrical Engineering Department, Oita University, Oita, Japan, June 23, 1994

Japan Society of Artificial Intelligence, June 22, 1994

NEC Symposium on Natural and Artificial Parallel Computation, Princeton, NJ, May 3--4, 1994

Physics Department, Stony Brook, April 12, 1994

Goldman, Sachs & Co., New York, April 11, 1994

Institute for Advanced Study, Around the Dyson Sphere, Princeton, NJ, April 8--9, 1994

Information Processing Society of Japan, Committee on Artificial Intelligence, Kogakuin University, Tokyo, Japan, March 8, 1994

Univeristy of Oklahoma, February 23, 1994

Santa Fe Institute, Computational and Molecular Approaches to Evolution, February 18--20, 1994

UCLA Center for Evolution and the Origin of Life, February 16, 1994

Interval Research Corp., Palo Alto, CA, February 14, 1994

Society of Instrument and Control Engineers, Osaka, Japan, January 27, 1994

Ministry of Science and Technology, Japan, January 19--21, 1994

Symbus Technology, Self-Determination of Developing and Evolving Systems, Cambridge, MA, January 6--9, 1994

Caltech, Electrical Engineering, January 4, 1994

Synaptics, San Jose, California, January 3, 1994

Japan Management Association, Tokyo, Japan, December 7, 1993

Japan Technology Transfer Association, Committee on Artificial Reality and Tele-Existence, Tokyo, Japan, November 4, 1993

Bionomics Institute, The Next Economy: An Evolving Information Ecosystem, San Francisco, October 8--9, 1993

ATR Science & Technology Seminar, Kyoto, Japan, September 29, 1993

XV International Botanical Congress, Yokohama, Japan, September 1993

SIAM (Society of Industrial and Applied Mathematics), San Francisco, August 4--6, 1993

Escuela de Biologia, Universidad de Costa Rica, San Jose, Costa Rica, July 6, 1993

ARS Electronica, Linz Austria, June 14--16, 1993

Cognitive Revolution, Denmark, June 12--13, 1993

European Conference on Artificial Life, Brussells Belgium, May 24-26, 1993

From Complex Dynamical Systems to Sciences of Artificial Reality, Numazu, Japan, April 5--9, 1993

GLOCOM, Tokyo, Japan, March 30, 1993

Mitsubishi, Artificial Life Conference, Tokyo, Japan, March 24-25, 1993

Omar Dengo Foundation, San Jose, Costa Rica, March 3, 1993

Platforms for Computing Forum, Phoenix, February 21--24, 1993

University of Southern California, Electrical Engineering Systems, February 19, 1993

California Institute of Technology, Physics Colloquium, La Jolla, CA, February 18, 1993

AAAS (American Association for the Advancement of Science), Boston, February 13, 1993

Harvard University, Biology, Lewontin's Lab, February 11, 1993

DARPA (Defense Advanced Research Projects Agency), Self-replicating Nano-systems Workshop, Santa Fe, October 19, 1992

IBM T. J. Watson Research Center, Physical Science Colloquium, October 6, 1992

Digital Equipment Corporation, Hudson, MA, September 29, 1992

Yale University, Computational Ecology Seminar, September 28, 1992

National Science Foundation, Molecular Evolution Meeting, Washington D.C. September 15--16, 1992

St. Johns College, Public Lecture, Santa Fe, NM, August 19, 1992

Microsoft, Seattle, WA, August 10, 1992

Stanford University, Adaptive Computation Symposium, July 17, 1992

Autodesk, Tech Forum, Sausalito, CA, July 16, 1992

Santa Fe Institute, Integrative Themes Meeting, July 8--15, 1992

Santa Fe Institute, Artificial Life Workshop, June 15--19, 1992

Gordon Conference on Theoretical Biology, New Hampshire, June 8--12, 1992

Summer School on Environmental Dynamics, Istituto Veneto, Venice, Italy, June 1--7, 1992

General Motors, Sigma Xi, May 15, 1992

Kent State Univ., Biology, May 14, 1992

Case Western Reserve University, Biology, May 13, 1992

Cornell University, Mathematical Sciences Inst., CA Workshop, May 10--12, 1992

University of Arizona, Ecology & Evolutionary Biology, March 24, 1992

Santa Fe Institute, Workshop on Adaptive Computation, March 10--15, 1992

Apple Computers, February 28, 1992

University of California at Berkeley, February 27, 1992

Stanford University, February 26, 1992

University of Oklahoma, Zoology, February 7, 1992

Roland Institute, Cambridge, MA, December 6, 1991

University of Massachusetts Boston, Biology, December 5, 1991

Bolt Beranek and Newman Inc. (BBN), Cambridge, MA, December 5, 1991

MIT Nanotechnology Study Group, December 3, 1991

Boston University, Computational Sciences Center, December 3, 1991

Texas Instruments, Dallas, November 21, 1991

American Society of Information Science, New Jersey, November 19, 1991

Digital Equipment Corp., Hudson, MA, November 15, 1991

Thinking Machines Corp., Cambridge, November 14, 1991

IBM T. J. Watson Research Center, Yorktown Heights, NY, November 13, 1991

The University of the Arts, Philadelphia, Design in Cyberspace lectures, November 12, 1991

Drexel University, Electrical Engineering, November 8, 1991

Stony Brook, Department of Ecology and Evolution, November 6, 1991

University of Delaware, Entomology, November 5, 1991

University of Kentucky, Lexington, Biology, October 31, 1991

University of Maryland, Zoology, October 29, 1991

University of Illinois, Complex Systems Colloquia, October 25, 1991

University of Rochester, Biology, October 18, 1991

National Science Foundation, Washington, September 20, 1991

European Society for Evolutionary Biology, Debrecen, Hungary, Sept. 1991

Santa Fe Institute, July 1991

International Conference on Genetic Algorithms, San Diego, July 1991

Large Scale Computing Analysis and Modeling Conference, Park City Utah, April 1991

University of Utah, Anthropology Department, April 1991

Bellcore, Morristown, NJ, April 1991

Princeton University, Ecology & Evolutionary Biology, April 1991

Villanova University, Biology Department, February 1991

SUNY Binghamton, Biology Department, December 1990

University of Sussex, School of Cognitive & Computing Sciences, England, November 1990

Cambridge University, Computer Laboratory, England, November 1990

Oxford University, Zoology Department, England, November 1990

Queen's Medical Center, Nottingham England, Dept. of Genetics, November 1990

Ecole Normale Supérieure, Biocomputing Group, CNRS, Paris, France, November 1990

CNRS, Center for Evolutionary Studies, Montpellier, France, November 1990

University of Basel, Zoology Institute, Switzerland, November 1990

Technical University of Denmark, Physics Laboratory, Copenhagen, November 1990



University of Aarhus, Institute of Genetics and Ecology, Denmark, October 1990

University of Aarhus, Botanical Institute, Denmark, October 1990

International Congress of Systematic and Evolutionary Biology, College Park, MD, July 1990

Artificial Life Conference, Santa Fe, February 1990

Los Alamos National Laboratory, Center for Nonlinear Studies, October 1989

Santa Fe Institute, October 1989

Numerical Taxonomy Meetings, Toronto, October 1989

Towson State University, Biology, 1988

BSA Symposium: The Role of Plant Development in Plant Population Biology, Davis, 1988

International Botanical Congress (poster), Berlin, 1987

American Institute of Biological Sciences, Amherst, 1986

Smithsonian Institution, 1986

Carnegie Museum of Natural History, 1986

New York Botanical Garden, 1986

University of Delaware, School of Agriculture, 1986

Symposium: Biology of Tropical Epiphytes, Marie Selby Botanical Garden, 1985

Workshop on Aroid Systematics, Harvard Forest, 1984

University of Southern California, 1982

University of California Los Angeles, 1982

University of California Berkeley, 1982

Symposium: Biology and Taxonomy of the Araceae, Marie Selby Botanical Garden, 1980

University of Delaware, 1980

Princeton University, 1980

Brown University, 1980

University of Iowa, 1979

University of Oklahoma, Botany Department, 1979

Duke University, 1978

Brown University, 1977

## **Professional Activities**

Faculty Sponsor for the OU student group: “Secular Sooners” July 2011 to present

Scientific Advisory Board, Lifeboat Foundation, <http://lifeboat.com/>

Member of Founding Board of the International Society for Artificial Life, <http://www.alife.org/>.

Editorial Board of the journal *Artificial Life* published by MIT Press, April 1993 to present, <http://www.mitpressjournals.org/loi/artl>

Associate Editor, International Journal for Artificial Life and Robotics, 1996 to present, <http://www.springer.com/computer/artificial/journal/10015>

Invited nominator for Kyoto Prize 1996 to present, <http://www.kyotoprize.org/>

Member of Knowledge Advisory Board, Planetary Collegium, <http://x2.i-dat.org/~mp/PC.html>, 2005 to present

Symposium Organizer: “Pharmacological Approaches to the Human Mind – Looking Forward”. University of Oklahoma, Norman, OK. August 25, 2016.

Reviewer, 2017 IEEE Congress on Evolutionary Computation (IEEE CEC 2017) Donostia / San Sebastian, Spain, June 5-8, 2017 (<http://www.cec2017.org/>)

Programme Committee member, 20th European Conference on Genetic Programming EuroGP 2017. Amsterdam, April 19-21, 2017 [http://www.evostar.org/2017/cfp\\_eurogp.php](http://www.evostar.org/2017/cfp_eurogp.php)

Programme Committee member, Genetic and Evolutionary Computation Conference, GECCO 2017, Berlin, July 15-19, 2017 <http://gecco-2017.sigevo.org/>

Program Committee Member, 19th European Conference on Genetic Programming, EuroGP 2016. [http://www.evostar.org/2016/cfp\\_eurogp.php](http://www.evostar.org/2016/cfp_eurogp.php).

Reviewer, Conference Paper, 2016 IEEE Congress on Evolutionary Computation, IEEE CEC 2016.  
<http://www.wcci2016.org>.

Program Committee Member, Artificial Life XV. The Fifteenth Conference on the Synthesis and Simulation of Living Systems. <http://alife.org/conference/alife-xv-2016>,  
<http://turing.iimas.unam.mx/alifeXV/>.

Program Committee Member, Genetic and Evolutionary Computation Conference, GECCO-2016.  
<http://gecco-2016.sigevo.org/index.html/HomePage>.

Program Committee Member, The Eleventh International Multi- Conference on Computing in the Global Information Technology, ICCGI 2016.  
<http://www.iaria.org/conferences2016/ICCGI16.html>.

Program Committee Member, 2015 IEEE Symposium Series on Computational Intelligence: IEEE Symposium on Artificial Life. <http://ieeessci.org.za:8080/IEEEALIFE/>. (August 2015).

Judge of virtual creatures competition, Genetic and Evolutionary Computation Conference (GECCO-2015). Judge entries to the virtual creatures competition.  
[http://www.cs.utexas.edu/~joel/virtual\\_creatures\\_contest2015/](http://www.cs.utexas.edu/~joel/virtual_creatures_contest2015/). (June 2015).

Program Committee member, 18<sup>th</sup> European Conference on Genetic Programming (EuroGP 2015), Copenhagen, Denmark, 8-10 April 2015, [http://www.evostar.org/2015/cfp\\_eurogp.php](http://www.evostar.org/2015/cfp_eurogp.php)

Program Committee member, The Tenth International Multi-Conference on Computing in the Global Information Technology (ICCGI 2015), October 11 - 16, 2015 - St. Julians, Malta,  
<http://www.iaria.org/conferences2015/ICCGI15.html>

Program Committee member, Genetic and Evolutionary Computation Conference (GECCO-2015), July 11-15, 2015, Madrid, Spain, <http://www.sigevo.org/gecco-2015/>

Program Committee of ECAL 2015, 13th European Conference on Artificial Life, York, United Kingdom, 20-24 July 2015, <http://www.cs.york.ac.uk/nature/ecal2015/>

ALIFE 14 Program Committee, ALIFE 14: The Fourteenth International Conference on the Synthesis and Simulation of Living Systems, July 31st - August 2nd, 2014, Javits Center, Manhattan, New York, NY, USA, <http://alife14.org>

ALIFE Program Committee Member, Genetic and Evolutionary Computation Conference, GECCO-2014, July 12-16, 2014, Vancouver, BC, Canada <http://www.sigevo.org/gecco-2014>

Programme Committee of EuroGP 2014, 17th European Conference on Genetic Programming, Granada, Spain, April 23-25, 2014, <http://www.evostar.org/flyer/EuroGP2014Flyer.pdf>

Programme Committee of the 12th European Conference on Artificial Life (ECAL 2013), Taormina, Italy, September 2-6, 2013. <http://www.dmi.unict.it/ecal2013/>

ALIFE PC Member on the Genetic and Evolutionary Computation Conference (GECCO-2013), Amsterdam, The Netherlands, July 6-10, 2013, <http://www.sigevo.org/gecco-2013/>

Program Committee of IEEE ALIFE 2013, The 2013 IEEE Symposium on Artificial Life, April 16–17, 2013, Grand Copthorne Waterfront Hotel, Singapore, <http://bingweb.binghamton.edu/~sayama/ieee-alife2013/>

Program Committee Member, Alife 13, The 13th International Conference on the Synthesis and Simulation of Living Systems, July 19-22, 2012, Michigan State University East Lansing, Michigan, USA, <http://alife13.org/>

Program Committee Member, GECCO-2011, July 12-16, 2011, Dublin, Ireland. <http://www.sigevo.org/gecco-2011/>

International Organizing Committee/International Program Committee, International Symposium on Artificial Life and Robotics (AROB 16<sup>th</sup> '11), Oita, Japan, June, 2011. <http://alife-robotics.co.jp/>

Member of the program committee of EvoIntelligence 2011, in conjunction with EvoStar, Torino Italy, 2011. <http://www.evostar.org>

Program Committee member for the Third IEEE Symposium on Artificial Life, to be held in Paris, France, as part of the 2011 IEEE Symposium Series on Computational Intelligence (SSCI) on April 11-15, 2011. <http://www.ieee-ssci.org/2011/ieee-alife-2011>

Programme Committee for EuroGP 2011, April 27-29, 2011, Torino, Italy (<http://evostar.dei.uc.pt/call-for-contributions/eurogp/>)

Member of the program committee of the ALife 12 Conference on the Synthesis and Simulation of Artificial Living Systems at the University of Southern Denmark, Odense, August 19-23, 2010, <http://alifexii.org/>

Member of the program committee of EvoIntelligence 2010, in conjunction with EvoStar, Istanbul Turkey, 2010. <http://www.evostar.org>

Programme Committee of the 13<sup>th</sup> European Conference on Genetic Programming, April 7-9, 2010, Istanbul. (<http://www.evostar.org/>).

Program Committee for Genetic Programming track of GECCO 2009, Montréal, Canada, July 8-12, 2009 (<http://www.sigevo.org/gecco-2009/>).

Program Committee for EuroGP 2009, Tübingen, Germany, April 15-17, 2009 (<http://evostar.na.icar.cnr.it/EuroGP/EuroGP.html>).

Program Committee for the Toward a Science of Consciousness Conference, Hong Kong, June 11-14, 2009 (<http://www.consciousness.arizona.edu/hongkong.htm>)

Programme Committee, IEEE CEC 2009 Special Session on “Evolutionary Robotics,” Trondheim, Norway, May 18-21, 2009, (<http://www.cec-2009.org/sessions.shtml>,  
<http://lis.epfl.ch/specialsessions/CEC09/>)

Program Committee, 2009 IEEE Symposium on Artificial Life, March 30 April 2, 2009 Sheraton Music City Hotel, Nashville, TN, USA, at the IEEE Symposium Series on Computational Intelligence 2009, ([http://homepages.feis.herts.ac.uk/~nehaniv/IEEE\\_ALIFE\\_2009.html](http://homepages.feis.herts.ac.uk/~nehaniv/IEEE_ALIFE_2009.html))

GECCO-2008 (Genetic and Evolutionary Computation Conference) Program Committee Member

International Organizing Committee/International Program Committee, International Symposium on Artificial Life and Robotics (AROB 13<sup>th</sup> '08), Oita, Japan, June, 2008.

International Organizing Committee/International Program Committee, International Symposium on Artificial Life and Robotics (AROB 12<sup>th</sup> '07), Oita, Japan, June, 2007.

GECCO-2007 (Genetic and Evolutionary Computation Conference) Program Committee Member

Program Committee for EuroGP 2007, April 2007, Valencia, Spain, <http://www.evostar.org/>

Organizing Committee and Scientific Committee for the Workshop on "Evolution of Complexity", in conjunction with the ALife X conference, June, 2006, Indiana University

GECCO-2006 (Genetic and Evolutionary Computation Conference) Program Committee Member

Program Committee for the Evolution of Complexity special issue of the journal, Artificial Life

Program Committee for the Workshop on “Machine Self-Replication”, in conjunction with the ALife X conference, June, 2006, Indiana University

International Organizing Committee/International Program Committee, International Symposium on Artificial Life and Robotics (AROB 11<sup>th</sup> '06), Oita, Japan, January 23-25, 2006.

GECCO-2005 (Genetic and Evolutionary Computation Conference) Program Committee Member

GECCO-2003,2004 (Genetic and Evolutionary Computation Conference) Program Committee Member

ECAL-2003 (European Conference on Artificial life) Program Committee Member

Chairman of the OU Arts and Sciences Support of Teaching and Research Committee, 2003-2004

Member of Board of Directors of the Norman Society of International Affairs, 2002

Co-chairman of the Norman-Seika Friendship Committee of the Norman Society of International Affairs, 2002-2004

Member of faculty search committee, OU Health Sciences Center Department of Immunology and Microbiology

Co-chairman of the Common Computing Needs Sub-committee of the Information Technology Council, 2002-2004

Member of the OU Arts and Sciences Support of Teaching and Research Committee, 2002-2004

Member of the OU Information Technology Council, 1999 to present

International Organizing Committee, International Symposium on Artificial Life and Robotics, Oita, Japan, January 26-28, 2000.

Member of Silicon Graphics Vanguard of Visual Computing Program,  
[http://www.sgi.com/newsroom/press\\_releases/1999/january/vanguards.html](http://www.sgi.com/newsroom/press_releases/1999/january/vanguards.html), from November 1998.

Scientific Committee member, The 5th European Conference on Artificial Life (ECAL99),  
<http://www.epfl.ch/ecal99>, EPFL in Lausanne, Switzerland, 13-17 September 1999.

Senior Program Committee member, 1999 Genetic and Evolutionary Computation Conference (GECCO-99). July 1999.

Program Committee, 4th International Conference on Virtual Systems and MultiMedia 1998,  
<http://www.vsmm.vsl.gifu-u.ac.jp/vsmm98>, The International Society on Virtual Systems and MultiMedia, Softopia, Gifu/Ogaki Japan, November, 18-20, 1998.

Program Committee, First International Conference on Virtual Worlds (ICVW+98),  
<http://www.devinci.fr/home/iim/vw98/vw98.htm>, International Institute of Multimedia, Paris, France, July 1-3, 1998.

Program Committee, Computation for Metaphors, Analogy and Agents: An International Workshop, <http://www.u-aizu.ac.jp/CMAA/welcome.html>, University of Aizu, Aizu-Wakamatsu City, Japan, April 6-10, 1998.

Program Committee, Bio-Computing and Emergent Computation (BCEC97),  
<http://www.ida.his.se/ida/~bcec/cfp1.html> Skovde, Sweden, 1-2 September 1997.

Program Committee, The 4th European Conference on Artificial Life (ECAL'97), Brighton, UK, 28-31 July 1997. <http://www.cogs.susx.ac.uk/ecal97/>

Program Committee member, Semigroups & Algebraic Engineering Conference, Aizu Japan, March 24-28, 1997. <http://www.u-aizu.ac.jp/~nehaniv/AE97.html>

Member of the International Steering Group of the University of Sussex School of Cognitive and Computing Sciences Evolutionary and Adaptive Systems program.

[http://www.cogs.susx.ac.uk/lab/adapt/easy\\_msc.html](http://www.cogs.susx.ac.uk/lab/adapt/easy_msc.html)

Member of the Program Committee, Artificial Life V Conference, Nara Japan, May 16-18, 1996.

<http://www.hip.atr.co.jp/departments/Dept6/ALife5.html>

Member of the Science Advisory Board of the Bionomics Institute, 1994 to present.

Member International Organizing Committee, International Symposium on Artificial Life and Robotics, Oita, Japan, February 18--20, 1996.

Program Committee for the IEEE Conference on Evolutionary Computation, December 1995, Perth, Australia.

Program Committee for the IEEE Conference on Evolutionary Computation, June 29 - July 1, 1994, Orlando, Florida.

International Programme Committee for ECAL '93 (European Conference on Artificial Life), Brussels, Belgium, May 24--26, 1993.

Scientific Committee, Istituto Veneto Di Scienze, Lettere Ed Arti, Venice, Italy, 1992 to present.

Research Priorities Committee, Tropical Biology section of the American Botanical Society, 1993.

Program Committee for the 1993 IEEE International Conference on Neural Networks.

Reviewer for SuperQuest 1992, a best-paper competition for work done on super-computers by high school students.

## **Publications**

Strong, D. R. and T. S. Ray. 1975. Host tree location behavior of a tropical vine ( *Monstera gigantea* ) by skototropism. *Science*, 190: 804--06.

Ray, T. S. 1976. Skototropism and the Natural History of Some Tropical Vines. Honors thesis in Biology, Florida State University.

Ray, T. S., A. Bien, G. Griswold, D. Lorence, E. Oddo, M. Noble. 1977. Vertical distribution of epiphytes at Monte Verde. *In Tropical Biology: An Ecological Approach*, #77.3. pp. 279--84. Organization for Tropical Studies, Durham, North Carolina.

Ray, T. S., and B. Brown. 1977. Vine community structure. *In Tropical Biology: An Ecological Approach*, #77.3. pp. 201--12. Organization for Tropical Studies, Durham, North Carolina.

- Griswold, G., and T. S. Ray. 1977. Life history and strange mode of germination of a thistle. *In* Tropical Biology: An Ecological Approach, #77.3. pp.249--52. Organization for Tropical Studies, Durham, North Carolina.
- Ray, T. S. 1978. Behavior of Tropical Vines. Winner of the 1978 Bowdoin Prize for Essays in the Natural Sciences. Harvard University Archives.
- Ray, T. S. 1979. Slow-motion world of plant 'behavior' visible in rainforest. *Smithsonian* 9(12): 121--30.
- Oberbauer, S., L. Boring, K. Herman, D. Lodge, T. Ray, S. Trombulak. 1980. Leaf morphology of *Monstera tenuis*. *In* Tropical Biology: An Ecological Approach, #79.1. pp.24--28. Organization for Tropical Studies, Durham, North Carolina.
- Ray, T. S., and C. C. Andrews. 1980. Antbutterflies: Butterflies that follow army ants to feed on antbird droppings. *Science* 210: 1147--1148.
- Ray, T. S. 1980. *Syngonium oduberi* (Araceae): A new species from the Osa Peninsula of Costa Rica. *Aroideana* 3(4): 128--129.
- Ray, T. S. 1981. Growth and heterophylly in an herbaceous tropical vine, *Syngonium*, (Araceae). Ph.D. Thesis, Harvard University. Pp.104.
- Ray, T. S. 1983. *Monstera tenuis*. *In* D. Janzen [ed.], Costa Rican natural history, 278--80. University of Chicago Press.
- Ray, T. S. 1983. *Syngonium triphyllum*. *In* D. Janzen [ed.], Costa Rican natural history, 333--35. University of Chicago Press.
- Ray, T. S. 1985. The host plant, *Erythroxylum* (Erythroxylaceae), of *Agrias* (Nymphalidae). *J. Lep. Soc.* 39(4):266--267.
- Ray, T. S. 1986. Growth correlations within the segment in the Araceae. *Amer.J. Bot.*73(7): 993--1001.
- Ray, T. S. 1987. Cyclic heterophylly in *Syngonium* (Araceae). *Amer. J. Bot.* 74(1): 16--26.
- Ray, T. S. 1987. Leaf types in the Araceae. *Amer. J. Bot.* 74(9): 1359--1372.
- Ray, T. S. 1987. Diversity of shoot organization in the Araceae. *Amer. J. Bot.*74(9): 1373--1387.
- Ray, T. S. 1988. Survey of shoot organization in the Araceae. *Amer. J. Bot.* 75(1): 56--84.
- Ray, T. S. 1988. Diversification of growth habits in the Araceae. *Amer. J. Bot.*76(Suppl.): 276.



- Ray, T. S., and S. Renner. 1990. Comparative studies on the morphology of the Araceae. A. Engler, 1877. Translation with an introduction, updated nomenclature, and a glossary. Englera 12. Pp.140.
- Ray, T. S. 1990. Application of "eigenshape" analysis to second order leaf shape ontogeny in *Syngonium podophyllum* (Araceae). In: Rohlf, F. J., and F. Bookstein [eds.], Proceedings of the Michigan Morphometrics Workshop, 201--213. University of Michigan Museum of Zoology.
- Ray, T. S. 1990. Metamorphosis in the Araceae. Amer. J. Bot. 77(12): 1599--1609.
- Ray, T. S. 1991. Is it alive, or is it GA? In: Belew, R. K., and L. B. Booker [eds.], Proceedings of the 1991 International Conference on Genetic Algorithms, 527--534. San Mateo, CA: Morgan Kaufmann.
- Ray, T. S. 1991. Evolution and optimization of digital organisms. In: Billingsley K. R., E. Derohanes, H. Brown, III [eds.], Scientific Excellence in Supercomputing: The IBM 1990 Contest Prize Papers, Athens, GA, 30602: The Baldwin Press, The University of Georgia. Publication date: December 1991, Pp. 489--531.
- Ray, T. S. 1991. Population dynamics of digital organisms. In : Langton, C. G. [ed.], Artificial Life II Video Proceedings. Redwood City, CA: Addison Wesley.
- Ray, T. S. 1991. An approach to the synthesis of life. In : Langton, C., C. Taylor, J. D. Farmer, & S. Rasmussen [eds.], Artificial Life II, Santa Fe Institute Studies in the Sciences of Complexity, vol. XI, 371--408. Redwood City, CA: Addison-Wesley.
- Ray, T. S. 1992. Evolution, ecology and optimization of digital organisms. Santa Fe Institute working paper 92-08-042.
- Ray, T. S. 1992. Landmark eigenshape analysis: homologous contours; leaf shape in *Syngonium* (Araceae). Amer. J. Bot. 79(1): 69--76.
- Ray, T. S. 1992. Foraging behaviour in tropical herbaceous climbers (Araceae). Journal of Ecology 80: 189--203.
- Ray, T. S. 1992. J'ai jou' Dieu et cr la vie dans mon ordinateur. Le Temps strat gique 47: 68--81.
- Ray, T. S. 1993. Quando giocavo a essere Dio. Virtual (Italian magazine), December 1993, 1(4): 40--46.
- Ray, T. S. 1993. Artificial Life: creatures in the computer. 1993 PC Forum Transcript, Pp. 119-126. EDventure Holdings Inc., New York.
- Ray, T. S. 1994. An evolutionary approach to synthetic biology: Zen and the art of creating life. Artificial Life 1(1/2): 195--226. Reprinted In: Langton, C. G. [ed.], Artificial Life, an overview. The MIT Press, 1995.

Ray, T. S. 1994. Artificial life and real computation. IPSJ-SIGAI Notes (Artificial Intelligence committee of the Information Processing Society of Japan) 94--AI--93 94(20): 31--38.

Ray, T. S. 1994. Jugu a ser Dios y cre la vida en mi computadora. *In*: Claudio Gutierrez [ed], *Epistemologia e Informatica*, 257--267. San Jose, Costa Rica: UNED, 1993.

Ray, T. S. 1994. Using artificial life to create parallel and networked processes through natural evolution. Japanese Society of Artificial Intelligence, NCJSAI '94.

Ray, T. S. 1994. Evolution and complexity. *In*: Cowan, George A., David Pines and David Metzger [eds.], *Complexity: Metaphors, Models, and Reality*, Pp. 161--173. Addison-Wesley Publishing Co.

Ray, T. S. 1994. Evolving autonomous software agents. Proceedings of the 3rd IEEE International Workshop on Robot and Human Communication, Pp. 7--11. July 18-20, 1994, Nagoya. IEEE Press, 1994.

Ray, T. S. 1994. Evolution, complexity, entropy, and artificial reality. *Physica D* 75: 239--263.

Ray, T. S. 1994. Neural networks, genetic algorithms and artificial life: adaptive computation. Proceedings of the 1994 ALife, Genetic Algorithm and Neural Networks Seminar; Institute of Systems, Control and Information Engineers. Pp. 1--14.

Thearling, Kurt, and Ray, T. S. 1994. Evolving multi-cellular artificial life. Brooks, Rodney A., and Pattie Maes [eds.], *Artificial Life IV conference proceedings*, Pp. 283--288. The MIT Press, Cambridge.

Ray, T. S. 1994. Digital biodiversity. Proceedings of BIO Japan '94 Osaka, International Conference on Biotechnology, Pp. 119--126.

Ray, T. S. 1994. Netlife - Creating a jungle on the internet. *In*: Nonlocated online: digital territories, incorporations and the matrix, Knowbotic Research (Ed.), *Medien Kunst Passagen* 3/94, Passagen Verlag, Koeln-Wien 95, ISSN 1019-419-4193.

Ray, T. S. 1995. Keihana life and ATR. *ATR Journal*. Winter 1995, 18: 11.

Ray, T. S. 1995. Artificial Life and the Evolution of Distributed Processes. *Journal of Japanese Society for Artificial Intelligence* 10(2): 213--221.

Ray, T. S. 1995. Digital Evolution as a Complex System. *Bussei Kenkyu* 63(6): 692-695 (published by Bussei Kenkyu Kanko Kai).

Ray, T. S. 1995. A proposal to create a network-wide biodiversity reserve for digital organisms. ATR Technical Report TR-H-133. Also located at:  
<http://www.hip.atr.co.jp/~ray/pubs/reserves/reserves.html>

Ray, T. S. 1995. An evolutionary approach to synthetic biology: Zen and the art of creating life. In: Langton, C. G. [ed.], *Artificial Life, an overview*. The MIT Press, 1995. Reprinted from: *Artificial Life* 1(1/2): 195-226.

Tom Ray, Jeremy Bruestle, Roger Gouin, Joseph Hart, Matt Jones, Kurt Thearling, Jan Hauser, Charles Ofria, and Titus Brown. 1995 *Tierra workshop report*.  
Located at: <http://www.isd.atr.co.jp/~ray/pubs/workshop/workshop.html>

Ray, T. S. 1995. From the organic jungle to the digital jungle 1, and From the organic jungle to the digital jungle 2. Included in: "Portraits in Cyberspace, an online art exhibition"  
<http://persona.www.media.mit.edu/1010/Exhibit/>

Cho, Sung-Bae, and Ray, T. S. 1995. An evolutionary approach to program transformation and synthesis. *International Journal of Software Engineering and Knowledge Engineering* 5(2): 179--192. Also, ATR Technical Report TR-H-126.

Ray, T. S. 1996. Evolving complexity. *International Symposium on Artificial Life and Robotics Proceedings*. Four pages, not numbered.

Ray, T. S. 1996. "Netlife - das Schaffen eines Dschungels im Internet." Stefan Iglhaut, Armin Medosch, Florian Rötzer (eds.), *Stadt am Netz, Ansichten von Telepolis*. Pp. 118--126. Berlin: Bollmann.

Ray, T. S. 1996. A network-wide biodiversity reserve for digital organisms. *In: Imagina 96 Proceedings*. Pp. 15--26. Institut National De L'audiovisuel, Bry-sur-Marne, France.

Kimezawa, Tsukasa, and Ray, T. S. 1996. Beagle (New Tierra Front end Tool).  
<http://www.isd.atr.co.jp/~kim/beagle/beagle.html>

Ray, T. S. 1996. "Soft Evolution." Takeshi Furuhashi (ed.), *Proceedings of the International Workshop on Soft Computing in Industry '96*. Pp. 241--244. The Institute of Electrical Engineers of Japan, Muroran Institute of Technology, Juroran, Hokkaido, Japan.

Ray, T. S. 1996. Evolution of parallel processes in organic and digital media. "Natural and Artificial Parallel Computation", Pp. 69--91. David Waltz, [ed.]. SIAM Press, Philadelphia.

Ray, T. S., Hayward R Alker, Manor Askenazi, Jennifer Cobb, Tarek Elaydi, Linda Feferman, Simon Fraser, Gilly Furse, Joseph Hart, Jan Hauser, Matt Jones, sukasa Kimezawa, Will Rose, Walter Tackett, Kurt Thearling. 1996 *Tierra workshop report*.  
<http://www.isd.atr.co.jp/~ray/pubs/workshop2/workshop2.html>

Ray, T. S. 1996. "An Approach to the Synthesis of Life." Chapter 3 of M. A. Boden (ed.), *The Philosophy of Artificial Life*. (Oxford Readings in Philosophy.) Pp. 111--145. Oxford: Oxford University Press, in press. Reprinted from C. G. Langton, C. Taylor, J. Doyne Farmer, & S. Rasmussen (eds.).

Ray, T. S. 1966. "Software Evolution." *Systems, Control and Information* 40(8): 337--343.

Ray, T. S. 1996. "Alife Methodology and its Applications." *Proceedings of the Mathematical Modeling and Problem Solving Study Group (MPS) of the Information Processing Society of Japan*. Information Processing Society of Japan, MPS10-1, pp.1--8 (1996.11)

Thearling, Kurt, and Thomas S. Ray. 1997. "Evolving Parallel Computation," *Complex Systems*, 10(3):229--237. (June 1996)

Ray, T. S. 1997. Selecting Naturally for Differentiation. *In: Koza, John R., Kalyanmoy Deb, Marco Dorigo, David B. Fogel, Max Garzon, Hitoshi Iba, and Rick L. Riolo [eds.]. Genetic Programming 1997: Proceedings of the Second Annual Conference, July 13--16, 1997, Stanford University, 414--419. San Francisco, CA: Morgan Kaufmann.*

Ray, T. S. 1997. Evolving Complexity. *Artificial Life and Robotics* 1(1): 21--26.

Ray, T. S. 1997. Biological models of evolution: simulation and instantiation. *In: A. Rinaldo, and A. Marani [Eds.], Environmental Dynamics Series IV, Istituto Veneto di Scienze, Lettere ed Arti, 63--88. Venice, Italy.*

Ray, T. S. 1997. Biological models of evolution: simulation and instantiation. *In: A. Rinaldo, and A. Marani [Eds.], Environmental Dynamics Series IV, Istituto Veneto di Scienze, Lettere ed Arti, 63--88. Venice, Italy.*

Ray, T. S. 1997. A computational approach to evolutionary biology. "Advanced Mathematical Approach to Biology, Takeyuki Hida, [ed.], 1--107. World Scientific Publishing Co. Pte. Ltd., Singapore. Also, ATR Technical Report TR-H-176.

Ray, T. S. 1997. Evolution as Artist. *In: "Art@Science", Sommerer C., Mignonneau L. [Eds], 81-91. Springer Vienna/New York.*

Ray, T. S. 1998. Selecting Naturally for Differentiation: preliminary evolutionary results. *Complexity*, 3(5): 25-33. John Wiley & Sons, Inc.

Ray, T. S. and Joseph Hart. 1998 Evolution of Differentiated Multi-threaded Digital Organisms. *In: Artificial Life VI proceedings, C. Adami, R. K. Belew, H. Kitano, and C. E. Taylor [eds.], 295-304. The MIT Press, Cambridge.*

Ray, T. S. Continuing Progress Report on the Network Experiment.  
<http://www.hip.atr.co.jp/~ray/tierra/netreport/netreport.html>

Ray, T. S. 1998. La vita artificiale. *In: Frontiere Della Vita, Estratto Dal Volume I. Gilbert, Walter, and Glauco Tocchini Valentini, [eds.], 109-125. Istituto della Enciclopedia Italiana, Fondata da Giovanni Treccani.*

Suzuki, H., Ray, T.S. 1999. Several Conditions to Cause Open-ended Evolution in Core-memory-type ALife Systems. In: The Special Interest Group Notes of Information Processing Society of Japan: Mathematical Modeling and Problem Solving. 99-MPS-27 (1999) 9-12.

Ray, T. S. 1999. An Evolutionary Approach to Synthetic Biology: Zen and the Art of Creating Life. In: Virtual Worlds: Synthetic Universes, Digital Life and Complexity, Jean-Claude Heudin [ed.], 29-65. New England Complex Systems Institute Series on Complexity, Perseus Books (Sd), Pp. 320.

Ray, T. S. 1999. Evolution of Differentiated Multi-threaded Digital Organisms. In: Proceedings of the 1999 IEEE/RSJ International Conference on Intelligent Robots and Systems, 1-10. Kyunghee Printing Co., Ltd., Korea.

Ray, T. S. 1999. Evolution of Differentiated Multi-threaded Digital Organisms. In: Proceedings of the Fourth International Symposium on Artificial Life and Robotics, M. Sugisaka and H. Tanaka [eds.], I-1. AROB, ISBN 4-9900462-9-3. Abstract only.

Suzuki, H., Ray, T.S. 2000. Conditions to Facilitate the Evolvability of Digital Proteins. In: Proceedings of the Fifth Joint Conference on Information Sciences (JCIS 2000), Vol. I. Association for Intelligent Machinery Inc., USA (2000). Pp. 1078-1082

Ray, T. S. Evolution of Complexity: Tissue Differentiation in Network Tierra. ATR Journal, Vol.40, pp.12-13 (2000.8)

Ray, Tom, and Chenmei Xu. 2000. Measures of Evolvability in Tierra. Proc. Of The Fifth Int. Symp. on Artificial Life and Robotics (AROB 5th'00), Masanori Sugisaka and Hiroshi Tanaka [eds.], Oita, Japan, I-12 - I-15.

Ray, T. S. and Joseph F. Hart. 2000. Evolution of Differentiation in Multithreaded Digital Organisms. In: "Artificial Life VII, Proceedings of the Seventh International Conference on Artificial Life," Mark A. Bedau, John S. McCaskill, Norman H. Packard, and Steen Rasmussen [eds.]. The MIT Press, Cambridge, MA, USA. Pp. 132--140

Ray, T. S. 2000. [Aesthetically Evolved Virtual Pets](#). In: "Artificial Life 7 Workshop Proceedings," Carlo C. Maley and Eilis Boudreau [eds.]. Proceedings of the Seventh Artificial Life Conference. Pp. 158--161.

Ray, T. S. 2000. Seven Years at ATR-HIP. ATR Journal, Vol.42, pp.11-12 (2000.2). Published in Japanese

Bedau, Mark A., John S. McCaskill, Norman H. Packard, Steen Rasmussen, Chris Adami, David G. Green, Takashi Ikegami, Kunihiko Kaneko, and Thomas S. Ray. 2001. Open Problems in Artificial Life. Artificial Life 6(4): 363-376.

Ray, T. S. 2001. [Overview of Tierra at ATR](#). In: "Technical Information, No.15, Technologies for Software Evolutionary Systems". ATR-HIP. Kyoto, Japan.

Ray, T. S. 2001. [Artificial Life](#). In: "[Frontiers of Life, Volume One The Origins of Life](#)", p. 107-124. Renato Dulbecco, David Baltimore, François Jacob, Rita Levi-Montalcini [eds.]. Academic Press.

Ray, T. S. 2001. [Aesthetically Evolved Virtual Pets](#). Leonardo 34(4): 313-316.

Ray, T. S. 2002. [Kurzweil's Turing Fallacy](#). In: Jay Wesley Richards [ed.]. "Are We Spiritual Machines?: Ray Kurzweil vs. the Critics of Strong AI", with George Gilder, Ray Kurzweil, William Dembski, John Searle, Michael Denton and Thomas Ray. Discovery Institute, Seattle. Pp. 116-127.

Ray, T. S. 2003. An Evolutionary Approach to Synthetic Biology: Zen in the Art of Creating Life. In: Advances in Evolutionary Computing, ed by Ghosh, A., Tsutsui, S. Natural Computing Series (Springer, Berlin Heidelberg New York 2003) pp 479-517.

Ray, T.S. and Chenmei Xu. 2001 (published in 2003). Measures of evolvability in Tierra. Artificial Life and Robotics 5:211-214.

Ray, T.S. and Joseph Hart. 2003. Evolution of Differentiated Multi-threaded Digital Organisms. In: On Growth, Form and Computers, edited by Sanjeev Kumar and Peter J Bentley, Elsevier Science, Pp. 319-336.

I.Tanev and T.Ray. 2004. Evolution of Sidewinding Locomotion of Simulated Limbless, Wheelless Robots, Proceedings of the 9th International Symposium on Artificial Life and Robotics (AROB04), Beppu, Japan, January 28-30 2004, pages 472-475.

Tanev, Ivan, T.Ray and Andrzej Buller. 2004. Evolution, Robustness and Adaptation of Sidewinding Locomotion of Simulated Snake-like Robot, Proceedings of the Genetic and Evolutionary Computation Conference (GECCO-2004). June 26-30, 2004, Seattle, USA, 627-639.

Tanev, Ivan, T.Ray and Andrzej Buller. 2004. Evolutionary Design, Robustness and Adaptation of Sidewinding Locomotion of Simulated Limbless Wheelless Robot, Proceedings of the 2004 IEEE Congress on Evolutionary Computation (CEC-2004), Portland, Oregon, USA, June 20-23, 2004, 2312-2319.

I.Tanev, Thomas Ray and Andrzej Buller. 2005. Evolution, Robustness and Adaptation of Sidewinding Locomotion of Simulated Snake-like Robot, Evolvable Machines: Theory & Practice, Series: Studies in Fuzziness and Soft Computing, Vol. 161, Nedjah, Nadia; de Macedo Mourelle, Luiza (Eds.), 2005, pp.21-41, Springer, ISBN: 3-540-22905-1.

I.Tanev, T.Ray and A.Buller. 2005. Automated Evolutionary Design, Robustness and Adaptation of Sidewinding Locomotion of a Simulated Snake-like Robot. IEEE Transactions on Robotics 21(4):632-645.

I.Tanev and T.Ray. 2005. Evolution of Sidewinding Locomotion of Simulated Limbless, Wheelless Robots, *Artificial Life and Robotics*, an International Journal, 9:117-122, Springer-Verlag.

I.Tanev, T.Ray, and K.Shimohara. 2006. Exploring the Analogy in the Emergent Properties of Locomotion Gaits of Snakebot Adapted to Challenging Terrain and Partial Damage. *Journal of the Institute of Systems, Control, and Information Engineers (ISCI)* 19(6):220-232.

Ray, T.S. 2006. Review of: *Life's Solution: Inevitable Humans in a Lonely Universe*, by Simon Conway Morris. *Artificial Life* 12(3):453-456.

I.Tanev, T.Ray and K.Shimohara. 2007. On the Analogy of the Emergent Properties of Evolved Locomotion Gaits of Simulated Snakebot. In: Aleksandar Lazinica(Ed.), *Mobile Robotics: Towards New Applications*, pp.559-578. Pro Literatur Verlag, Germany / ARS, Austria, 2006, ISBN:3-86611-314-5. <http://s.i-techonline.com/Book/Mobile-Robots-Towards-New-Applications/ISBN978-3-86611-314-5.html>

Ray, T.S. 2009. Artificial Life Programs and Evolution. In: Michael Ruse and Joseph Travis editors, *Companion to Evolution*. Cambridge, Mass.: Harvard University Press. Pp. 429-433. Published Feb 12, 2009, Darwin's 200<sup>th</sup> birthday.

Ray, T.S. 2010. Psychedelics and the Human Receptorome. PLoS ONE. <http://dx.plos.org/10.1371/journal.pone.0009019>, February 2, 2010.

Jie Shao and Thomas S. Ray (2010), "Maintenance of Species Diversity by Predation in the Tierra System," In H. Fellermann, M. Dörr, M. M. Hanczyc, L. L. Laursen, S. Maurer, D. Merkle, P. Monnard, K. Støy and S. Rasmussen (eds.) *Artificial Life XII: Proceedings of the Twelfth International Conference on the Synthesis and Simulation of Living Systems*, pp. 533-540. MIT Press, Cambridge, MA. [<http://mitpress.mit.edu/catalog/item/default.asp?type=2&tid=12433>]

Ray, T.S. 2012. Network Tierra. In: Sarah Cook and Sara Diamond (eds.), *Euphoria & Dystopia: The Banff New Media Institute Dialogues*, pp. 347-351. Banff/Toronto: The Banff Centre Press & Riverside Architectural Press.

Ray, T. S. 2012. Mental Organs and the Origins of Mind. In: L. Swan (Ed) *Origins of Mind*, pp. 301-326. New York / Heidelberg: Springer.

Ray, T.S. 2013. Future minds, mental organs and ways of knowing. *Technoetic Arts: A Journal of Speculative Research* 10(2&3):185-195, Bristol: Intellect. doi: 10.1386/tear.10.2-3.185\_1

Ray, T.S. 2013. Future Minds, Mental Organs, and Ways of Knowing. In: Bulatov, D. (Ed) *Evolution Haute Couture: Art and Science in the Postbiological Age*, pp. 320-335. (NCCA: Kaliningrad).

Ray, T.S. 2014. Aesthetically Evolved Virtual Pets, Virtual Creatures Contest runner-up. The Virtual Creatures Competition was held in the competition session at the 2014 Genetic and Evolutionary Computation Conference (GECCO 2014, <http://www.sigevo.org/gecco-2014/>).  
[http://www.cs.utexas.edu/~joel/virtual\\_creatures\\_contest/results/](http://www.cs.utexas.edu/~joel/virtual_creatures_contest/results/)  
[http://www.cs.utexas.edu/~joel/virtual\\_creatures\\_contest/results/ray/TomRayAestheticallyEvolvedVirtualPetsVideo.pdf](http://www.cs.utexas.edu/~joel/virtual_creatures_contest/results/ray/TomRayAestheticallyEvolvedVirtualPetsVideo.pdf)  
[http://www.cs.utexas.edu/~joel/virtual\\_creatures\\_contest/results/ray/TomRayVirtualCreatures.avi](http://www.cs.utexas.edu/~joel/virtual_creatures_contest/results/ray/TomRayVirtualCreatures.avi)  
<http://life.ou.edu/pubs/AestheticallyEvolvedVirtualPetsVideo.pdf>  
<http://life.ou.edu/Video/VirtualCreatures.avi>

Ray, T. S. 2014. Afterword: A Branching Future of Synthetic Minds. In: Beta Life, Stories From an A-Life Future, pp. 315-321. Martyn Amos & Ra Page (eds.) (Comma Press, England, [www.commapress.co.uk](http://www.commapress.co.uk)). <http://life.ou.edu/pubs/OrrRayBetaLife.pdf>

Ray, T. S. 2015. Constructing the ecstasy of MDMA from its component mental organs: Proposing the primer/probe method. *Medical Hypotheses* / Elsevier, 87, 48-60.  
<http://dx.doi.org/10.1016/j.mehy.2015.12.018>. [http://www.medical-hypotheses.com/article/S0306-9877\(15\)00472-7/fulltext](http://www.medical-hypotheses.com/article/S0306-9877(15)00472-7/fulltext).

Ray, T. S. 2016. Aesthetically Evolved Virtual Pets.  
<http://www.interliamag.org/audiovisual/thomas-ray-aesthetically-evolved-virtual-pets/>  
reprinted from [http://www.cs.utexas.edu/~joel/virtual\\_creatures\\_contest/results/](http://www.cs.utexas.edu/~joel/virtual_creatures_contest/results/),  
[http://www.cs.utexas.edu/~joel/virtual\\_creatures\\_contest/results/ray/TomRayAestheticallyEvolvedVirtualPetsVideo.pdf](http://www.cs.utexas.edu/~joel/virtual_creatures_contest/results/ray/TomRayAestheticallyEvolvedVirtualPetsVideo.pdf)