

## DAVID ANDREW CRAIN

Associate Professor

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### ACADEMIC DEGREES

Ph.D. 1997. University of Florida, Department of Zoology, Gainesville, FL. Directed by Louis Guillette, Jr. "Effects of Endocrine-Disrupting Contaminants on Reproduction in the American Alligator, *Alligator mississippiensis*."

M.S. 1994. University of Florida, Department of Zoology, Gainesville, FL. Directed by Karen A. Bjorndal and Louis J. Guillette, Jr. "Insulin-like Growth Factor-I in the Plasma of Two Chelonians: *Caretta Caretta* and *Trachemys scripta elegans*."

B.S. 1992. Clemson University, Department of Biology, Clemson, SC. Graduated Magna Cum Laude.

### PROFESSIONAL EXPERIENCES

#### ***Teaching Positions***

August 1998 to present. Associate Professor of Biology (2003-present) and Assistant Professor of Biology (1998-2003), Division of Natural Sciences, Maryville College. Lecturer and laboratory coordinator for Human Anatomy and Physiology I (BIO 217), Human Anatomy and Physiology II (BIO 218), Animal Physiology (BIO 412), Developmental Biology (BIO 414), Ornithology (BIO 403) and lecturer for Environmental Toxicology (SCI 350), Biology Research Seminar (BIO 299), Freshman Biology: Principals of Cellular Biology (BIO 115), Perspectives on the Environment (FRS 130), Senior Seminar on Science and Religion (SRS 480), and Senior Seminar on Love – Scientific and Humanistic Definitions (SRS 480).

August 1997 to May 1998. Assistant Professor of Biology, University of Mississippi. Lecturer and laboratory coordinator for Introductory Physiology, BISC 330. Developed new lectures and laboratories. Lectures focused on a systems-level approach to physiology, while labs illustrated these principals using both model animal species and computer-assisted programs.

August-December, 1996. Teaching Assistant. Director of the Comparative Chordate Embryology Laboratory for Zoology Majors, University of Florida, Gainesville, Fl.

August, 1994-May, 1995. Teaching Assistant. Director of the Animal Physiology Laboratory for Biology Majors, University of Florida, Gainesville Fl.

January-May, 1994 Teaching Assistant. Introductory Biology Laboratory for Biology Majors, University of Florida, Gainesville FL.

## ***Research Positions***

Undergraduate Research Assistant. Field and laboratory research on the effects of environmental contaminants on wildlife species. The Institute of Wildlife and Environmental Toxicology. Clemson University, Clemson, S.C. 1989-1992.

Field Researcher. Loggerhead sea turtle conservation and education project. Pritchard's Island, S.C. University of South Carolina, Beaufort. May-August, 1990.

Research Supervisor. Post-Hurricane Hugo habitat assessment team. Supervised a crew of 8 in the collection of data from Cape Romain National Refuge, and helped to compile and analyze this data. Clemson University, Clemson, S.C. May-August, 1991.

Research Supervisor. Loggerhead sea turtle conservation and education project. Pritchard's Island, S.C. University of South Carolina, Beaufort, S.C. May-August, 1992.

Lab Technician. Reproductive physiology and hormone assays. Laboratory for Biotechnologies for the Ecological, Evolutionary, and Conservation Sciences (BEECS), U.F. August-December, 1993.

Research Assistant. Identification of growth factors in reptiles. Dr. Louis Guillette's Laboratory, U.F. May-August, 1994.

Research Assistant. Effects of environmental contaminants on the reproduction of reptiles. Dr. Louis Guillette's Laboratory, U.F. May-August, 1995.

Environmental Protection Agency Pre-Doctoral Fellow. Effects of environmental contaminants on the reproduction of reptiles. Dr. Louis Guillette's Laboratory, U.F. August 1995 to August 1997.

Assistant Professor (August 1997-May 2003), Associate Professor (May 2003-present). Examining the effects of endocrine-altering substances on the reproduction of vertebrates.

## ***Research Advisor for Undergraduate Research / Honors Theses***

Shadi Tolymat. Thyroid structure in turtles. University of Florida. August-December, 1993.

Animek VanWatershoot. Insulin-like growth factor binding proteins in reptilian plasma. University of Florida. January-May, 1994.

Erica Schmidt. Sex-hormone binding globulin in reptiles. University of Florida. May-August, 1994.

Amy Pickle. Characterization of proteins the yolk and albumen of reptile eggs. University of Florida. August-December, 1994.

Michelle Scargle. Contaminant effects on reptilian egg albumen and yolk proteins. University of Florida. January-May, 1995.

Daniel Tolymat. Gonadal histopathology of alligators exposed to environmental contaminants. University of Florida. January-August, 1996.

Megan Pew. Experimental design and treatment of alligators with various herbicides and pesticides. University of Florida. May-August, 1996.

Bart Edmiston. Liver and thyroid histopathology of alligators exposed to environmental contaminants. University of Florida. May, 1995-December, 1996.

Christie Waldi. Ontogeny of the alligator gonad - a histopathological study. University of Florida. May-December, 1996.

Karen Umfress. Introduction to physiology laboratory analyses. University of Mississippi. August-December, 1997.

Son Lam. Thyroid histopathology from hatchling alligators exposed to herbicides. University of Mississippi. January-May, 1998.

Ryan Anderson. Liver histopathology from hatchling alligators exposed to herbicides. University of Mississippi. January-May 1998.

Matt McGlasson. Sexual dimorphism in the brains of dark-eyed juncos (*Junco hyemalis*). University of Mississippi. January-May 1998.

Jennifer Windrow. A study of captive-born female white rhinoceroses and their mating behaviors. Maryville College. August-December, 1998.

Audrey McFadden. The effects of vitamin C on tooth plasticity. Maryville College. August-December, 1998.

Misty Herron. Dehydroepi-androsterone and its effects on memory and body weight in ND4 swiss webster mice. Maryville College. January 1999 to December 1999.

TJ Emory. The Effects of Hypoxia and Hyperoxia on Blood Analysis and Behavior of Rainbow Trout (*Oncorhynchus mykiss*) and the Northern Hogsucker (*Hypentelium nigricans*). Maryville College. January 1999 to December 1999.

Aaron Pate. Veterinary parasitology: an investigation of a common dairy parasite. Maryville College. January 1999- December 1999.

Adam Gil. Ventilation rate in crayfish exposed to common fertilizers. Maryville College. January 1999-May 2000.

Jodi Lloyd. The efficacy and macroscopic effect of antihelminthics on the tapeworm *Hymenolepis diminuta*. August 1999 to May 2000.

Paige Morefield. An in vitro study of estrogen's reversal of osteoporosis. August 1999 to May 2000.

Elizabeth Hewitt. A histological analysis of thyroid glands in juvenile alligators taken from contaminated and reference sites on Lake Okeechobee Florida, USA. May 1999 to May 2000.

Kate Davis. Status of lateral dominance in vertebrates of different classes. January 2000 to December 2000.

Jennifer Mann. Methodological comparison of cadistic and linguistic reconstructions. January 2000-December 2000.

Kim Newcombe. Active and passive rehabilitation after lumbar damage. August 2000 to May 2001.

Jessica Buckner. Geomagnetic orientation of the mountain dusky salamander (*Desmognathus ochrophaeus*). August 2000-May 2001.

Jessi Brown. Growth abnormalities in *Rana pipens* exposed to organophosphates. January 2001 to December 2001.

Monica Hawkins. Thyroid abnormalities in tadpoles exposed to organophosphate insecticides. January 2001 to present.

Jeremiah Bivens. Vasodilatory effects of the red wine polyphenols on bovine arteries. January 2001 to December 2001.

Erin Verhofstadt. Effects of music therapy on memory in the common lab mouse. August 2001 to May 2002.

Corrie Thomas. Rehabilitation after ACL injuries. January 2002 to December 2002.

Brent Robinson. Effects of hemolysis on standard blood parameters. January 2002 to December 2002.

Robert Taylor. Gonadal histology in juvenile alligators of 3 Florida lakes. January 2002 to December 2002.

Catherine Webb. Effects of the organophosphate pesticide malathion on metamorphosis in *Xenopus laevis*. August 2002-May 2003.

Eric Johnson. Magnetism and alteration in action potential generation. January 2003 to December 2003.

Alan Brock. Depletion of dentin calcium as a result of topical tooth treatments. January 2003 to December 2003.

- Lauren Butz. Testicular growth and testosterone concentrations in rainbow trout (*Oncorhynchus mykiss*) exposed to an environmental endocrine disruptor. August 2003 to May 2003.
- Chris Lehman. Use of IDEXX C6 ELISA for detection of Lyme disease in dogs of a non-endemic area. January 2004-December 2004.
- Jenny Wilson. Effects of atrazine and ethinylestradiol on *Xenopus laevis* tadpoles. January 2004-December 2004.
- Elizabeth Rushworth. Variables that affect the incidence of bilateral tears in the anterior cruciate ligaments. August 2004-December 2004.
- Ivy Parsons. The effects of fluoxetine on Siamese fighting fish (*Betta splendens*). August 2004-December 2005.
- Ginger Lovingood. Effects of atrazine on larynx development in *Xenopus laevis*. January 2005-December 2005.
- Travis Groth. Effects of atrazine on ovary development in *Xenopus laevis*. January 2005- December 2005.
- Austin Mackens. Effects of atrazine on testis development in *Xenopus laevis*. January 2005-December 2005.
- Rhiannon Foust. Effect of diet on circadian rhythmicity in Zebrafish (*Danio rerio*). January 2006-December, 2006.
- Jessica Kitchens. The influence of temperature and time on results of the comprehensive metabolic panel (CMP) for human blood samples. January 2006- December, 2006.
- Angie Castle. The effect and dependency of L-thyroxine treatment on the basal metabolic rate of postmetamorphic *Xenopus laevis*. August 2006-present.
- Maki Ishida. Antimicrobial effects of two herbal remedies. August 2006-present.
- Charlotte Taylor. The effect of L-thyroxine on liver metamorphosis in *Xenopus laevis*. January 2007-present.
- Lindsay Hill. Soy-derived genestein and the thyroid/ovarian axes. January 2007-present.
- Erin French. Physiological and behavioral changes in response to captivity stress in Wilson's tree frog. January 2007-present.

### ***Instructional Teaching for Professionals***

- Mumtaz Pasha. U.S. Environmental Protection Agency Regional Research Director. Techniques in analysis of steroid hormones in fish species. May, 1995.
- Leroy Folmar. U.S. Environmental Protection Agency Regional Research Director. Estradiol concentrations in contaminant-exposed fish. May, 1996.
- Jose Luis Osorno. PhD candidate. University of Florida. Avian behaviorist. Analysis of hormones in avian species. June, 1996.
- David Jennings. PhD candidate. University of Colorado. Developmental biologist. Analysis of thyroid hormones in a direct developing frog. Summers of 1996 and 1997.
- Elena Amesbury. PhD candidate. University of Central Florida. Reproductive physiologist. Maternal-embryonic hormonal interactions in the sting ray. May 1996

Madeline Mattison. PhD candidate. University of Denmark. Mammalian reproductive physiologist. Analysis of steroid hormones in Ringed seals exposed to environmental contaminants. August 1996.

Nigel Noriaga. PhD candidate. University of California, Berkeley. Amphibian reproductive physiologist. The binding of environmental xenoestrogens to the amphibian estrogen receptor. June 1998.

Thomas Rainwater. PhD candidate. Texas Tech University. Steroid hormones in crocodile plasma. Summers of 2001 and 2002.

Tamatha Barbareau. PhD candidate. University of Florida. Insulin-like growth factor hormones in the plasma of *Rana* and *Xenopus laevis* frogs. August 2002.

### **Professional Organizations/Service**

Manuscript Reviewer for SCOPE (Scientific Committee on Problems of the Environment), IUPAC (International Union of Pure and Applied Chemistry) and the following journals: Chemosphere, ZooBiology, Environmental Toxicology and Chemistry, Biological Conservation. 1999-Present.

New Textbook Reviewer for WCB McGraw-Hill and Society for Environmental Toxicology and Chemistry (SETAC). 1999-Present.

Member. Council on Undergraduate Research (CUR). 1999-Present.

Chair of the Maryville College physical resources review for Southern Association of Colleges and Schools (SACS) accreditation. 2000-2003.

Member of the Maryville College Window of Opportunity Resources for Excellence Group. 2001-present.

Faculty representative to the Maryville College student government association. 2000-2001.

Member of the Maryville College Human and Animal Subjects Committee. 1999-present.

Coordinator of the 2001 East Tennessee Regional Science Olympiad Competition, a competition for middle and high school science students. March 17, 2001.

Science representative for the 2001 and 2002 Maryville College open house, a time when prospective students examine Maryville College academics and residential life.

Attended a conference entitled: Annual Conference on the First-Year Experience; National Resource Center for the First Year Experience and Students in Transition. Feb 21-25, 2003. Atlanta Ga.

Discussion facilitator for the Maryville College National Advisory Council summit on "Information Technology." October 2-3, 2003.

Runner-up Teacher of the Year. Maryville College faculty honor. May, 2004.

Instructor of "Turtles—analyses from microscope slides to turtle behavior." Maryville College Middle School Summer Science Academy. Summer of 2003 and 2005.

Leader of "Finding salamanders in the Smoky Mountain's National Park." Maryville College Middle School Summer Science Academy. Summers of 2003 and 2005.

Co-lead a workshop for Grade 4-8 science teachers. Coordinated sessions on how to emphasize scientific methodology in the middle school classroom. June 6-10, 2005.

Foundations of Excellence Task Force Member. The task force is charged with evaluating and improving the Maryville College first year experience. August 2003 to present.

Member of Technology Advisory and Planning Committee, Maryville College. This committee is charged with advising the college on technology issues. September 2003 to August 2005.

Maryville College Faculty Hearings and Appeals Committee. August 2004 to present.

Coordinator of the Freshman Seminar 130: Perspectives on the Environment course at Maryville College. Organize the course for 15 other faculty members. May 2005 to present.

Emcee for the Volunteer Legacy Coalition Global Warming Conference. July 25, 2006. Maryville College, Maryville, TN.

## REFEREED PUBLICATIONS

1. CRAIN, D.A., T.S. GROSS, M.C. COX, AND L.J. GUILLETTE, JR. 1995. Insulin-like growth factor-I in the plasma of two reptiles: Assay development and validations. *General and Comparative Endocrinology* 98: 26-34.
2. CRAIN, D.A., A.B. BOLTEN, K.A. BJORN DAL, T.S. GROSS, AND L.J. GUILLETTE, JR. 1995. Size-dependent, sex-dependent, and seasonal changes in insulin-like growth factor I in the loggerhead sea turtle (*Caretta caretta*). *General and Comparative Endocrinology* 98: 219-226.
3. CRAIN, D.A., A.B. BOLTEN, AND K.A. BJORN DAL. 1995. Effects of beach nourishment on sea turtles: Review and research initiatives. *Restoration Ecology* 3: 95-104.
4. GROSS, T.S., D.A. CRAIN, K.A. BJORN DAL, A.B. BOLTEN, AND R.R. CARTHY. 1995. Identification of sex in hatchling loggerhead turtles (*Caretta caretta*) by analysis of steroid concentrations in chorioallantoic/amniotic fluid. *General and Comparative Endocrinology* 99: 204-210.
5. GUILLETTE, L.J., JR., D.A. CRAIN, A.A. ROONEY, AND D.B. PICKFORD. 1995. Organization versus activation: the role of endocrine-disrupting contaminants (EDCs) during embryonic development in wildlife. *Environmental Health Perspectives* 103 (Supplement 7): 157-164.
6. GUILLETTE, L.J., JR., D.B. PICKFORD, D.A. CRAIN, A.A. ROONEY, AND H.F. PERCIVAL. 1996. Reduction in penis size and plasma testosterone concentrations in juvenile alligators living in a contaminated environment. *General and Comparative Endocrinology* 101: 32-42.
7. GUILLETTE, L.J., JR., AND D.A. CRAIN. 1996. Endocrine-disrupting contaminants and reproductive abnormalities in reptiles. *Comments on Toxicology* 5: 381-399.
8. GUILLETTE, L.J., JR., M.C. COX, AND D.A. CRAIN. 1996. Plasma insulin-like growth factor-I concentration during the reproductive cycle of the American alligator (*Alligator mississippiensis*). *General and Comparative Endocrinology* 104: 116-122.
9. FOLMAR, L.C., N.W. DENSLOW, V. RAO, M. CHOW, D.A. CRAIN, J. ENBLUM, J. MARCINO, AND L.J. GUILLETTE, JR. 1996. Vitellogenin induction and reduced serum testosterone concentrations in feral male carp (*Cyprinus carpio*) captured near a major metropolitan sewage treatment plant. *Environmental Health Perspectives* 104: 1096-1101.
10. VONIER, P.M., D.A. CRAIN, J.A. MCLACHLAN, L.J. GUILLETTE, JR., AND S.F. ARNOLD. 1996. Interaction of environmental chemicals with the estrogen and progesterone receptors from the oviduct of the American alligator. *Environmental Health Perspectives* 104: 1318-1322.
11. CRAIN, D.A. AND L.J. GUILLETTE. 1997. Endocrine-disrupting contaminants and reproduction in wildlife. *Reviews in Toxicology* 1: 207-231.
12. CRAIN, D.A., L.J. GUILLETTE, JR., A.A. ROONEY, AND D.B. PICKFORD. 1997. Alterations in steroidogenesis alligators (*Alligator mississippiensis*) exposed naturally and experimentally to environmental contaminants. *Environmental Health Perspectives* 105: 528-533.
13. GUILLETTE, L.J., JR., D.A. CRAIN, A.A. ROONEY, AND A.R. WOODWARD. 1997. Effect of acute stress on plasma concentrations of sex and stress hormones in juvenile alligators living in

- control and contaminated lakes. *Journal of Herpetology* 31: 347-353.
14. GUILLETTE, L.J., JR., A.R. WOODWARD, D.A. CRAIN, G.R. MASSON, B.D. PALMER, M.C. COX, Q. YOU-XIANG, AND E.F. ORLANDO. 1997. The reproductive cycle of the female American alligator (*Alligator mississippiensis*). *General and Comparative Endocrinology* 108: 87-101.
  15. CRAIN, D.A., N.N. NORIEGA, P.M. VONIER, S.F. ARNOLD, J.A. MCLACHLAN, AND L.J. GUILLETTE, JR. 1998. Cellular bioavailability of natural hormones and environmental contaminants as a function of serum and cytosolic binding factors. *Toxicology and Industrial Health*. 14: 261-273.
  16. CRAIN, D.A., L.J. GUILLETTE, JR., D.B. PICKFORD, H.F. PERCIVAL, AND A.R. WOODWARD. 1998. Sex-steroid and thyroid hormone concentrations in juvenile alligators (*Alligator mississippiensis*) from contaminated and reference lakes in Florida. *Environmental Toxicology and Chemistry* 17: 446-452.
  17. MATTER, J.M., D.A. CRAIN, C. SILLS-MCMURRY, D.B. PICKFORD, T.R. RAINWATER, K.D. REYNOLDS, A.A. ROONEY, R.L. DICKERSON, AND L.J. GUILLETTE, JR. 1998. Effects of endocrine-disrupting contaminants in reptiles: alligators. Chapter 11, Pgs 267-289 in "Principles and Processes for Evaluating Endocrine Disruption." SETAC Press.
  18. CRAIN, D.A. AND L.J. GUILLETTE, JR. 1998. Reptiles as models of contaminant-induced endocrine disruption. *Animal Reproduction Science* 53: 77-86.
  19. CRAIN, D.A., I.D. SPITERI, AND L.J. GUILLETTE, JR. 1999. The functional and structural observations of the neonatal reproductive system of alligators exposed *in ovo* to atrazine, 2,4-D, or estradiol. *Toxicology and Industrial Health* 15: 180-185.
  20. MORTIMER, J. AND D. CRAIN. 1999. Sex steroid concentrations in immature hawksbill turtles (*Eretmochelys imbricata*) in the Chagos archipelago. Chapter 13 in Ecology of the Chagos Archipelago, C.R.C. Sheppard & M.R.D. Seaward, Eds. Linnean Society Occasional Publications 2. Westbury Publishing, West Yorkshire, Great Britain.
  21. GUILLETTE, L.J., A.A. ROONEY, D.A. CRAIN, AND E.F. ORLANDO. 1999. Steroid hormones as biomarkers of endocrine disruption in wildlife. In Environmental Toxicology and Risk Assessment: Standardization of Biomarkers for Endocrine Disruption and Environmental Assessment: Eighth Volume; D.S. Henshel, M.C. Black, and M.C. Harrass, Eds. American Society for Testing and Materials, West Conshohocken, PA.
  22. GUILLETTE, L., A. WOODWARD, D. CRAIN, D. PICKFORD, A. ROONEY, F. PERCIVAL. 1999. Plasma steroid concentrations and male phallus size in juvenile alligators from seven Florida Lakes. *General and Comparative Endocrinology* 116: 356-372.
  23. PICKFORD, D.B., L. GUILLETTE, D. CRAIN, A. ROONEY, AND A. WOODWARD. 2000. Plasma dihydrotestosterone concentrations and phallus size in juvenile American alligators (*Alligator mississippiensis*) from contaminated and reference populations. *Journal of Herpetology* 34: 233-239.
  24. CRAIN, D., A. ROONEY, E. ORLANDO, AND L. GUILLETTE. 2000. Endocrine disrupting contaminants and hormone dynamics: lessons from wildlife. In Environmental Endocrine Disruptors: An Evolutionary Perspective. L.J. Guillette and D.A. Crain, Eds. Taylor and Francis, New York, NY.
  25. GUILLETTE, L., D. CRAIN, M. GUNDERSON, S. KOOLS, M. MILNES, E. ORLANDO, A. ROONEY, AND A. WOODWARD. 2000. Alligators and endocrine disrupting contaminants: A current perspective. *American Zoologist* 40: 438-452.
  26. GUNDERSON, M.P., D.S. BERMUDEZ, T.A. BRYAN, D.A. CRAIN, S. DEGALA, T.M. EDWARDS, S.A.E. KOOLS, M.R. MILNES, AND L.J. GUILLETTE, JR. 2002. Temporal and spatial variation in plasma thyroxine (T<sub>4</sub>) concentrations in juvenile alligators collected from Lake Okeechobee and the northern everglades, Florida, USA. *Environmental Toxicology and Chemistry* 21: 914-921.

27. HEWITT, E.A., D. CRAIN, M. GUNDERSON, AND L.J. GUILLETTE, JR. 2002. Thyroid status in juvenile alligators (*Alligator mississippiensis*) from contaminated and reference sites on Lake Okeechobee, Florida, USA. *Chemosphere* 47: 1129-1135.
28. ROONEY, A.A, D. CRAIN, A. WOODWARD, AND L.J. GUILLETTE, JR. 2004. Seasonal variation in sex steroid concentrations in juvenile American alligators. *General and Comparative Endocrinology* 135:25-34.
29. WEBB, C.M. AND D.A. CRAIN. 2006. Effects of ecologically relevant doses of malathion on developing *Xenopus laevis* tadpoles. *Bios* 77: 1-6.
30. CRAIN, D. A., ERIKSON, M., IGUCHI, T., JOBLING, S., LAUFER, G., LEBLANC, G.A., and GUILLETTE, L.J. 2007. An Ecological Assessment of Bisphenol-A: Evidence from Comparative Biology. *Reproductive Toxicology* **In review**.
31. FLOYD, R.H., J. WADE, AND D.A. CRAIN. 2007. Differential acute sensitivity of wild *Rana sylvatica* and laboratory *Xenopus laevis* tadpoles to the herbicide atrazine. *Bios*. Submitted.
32. BARBEAU, T.R., C.M. BAILEY, D.A. CRAIN, K. WERRY, C.C. HELBING, AND L.J. GUILLETTE. 2006. Altered endocrine parameters in female frogs (*Xenopus laevis*) exposed to environmentally relevant concentrations of nitrate. *Proceedings of the National Academy of Sciences*. Submitted.

## PAPERS PRESENTED

1. CRAIN, D.A., T.S. GROSS, K.A. BJORNDAL, A.B. BOLTEN, R. CARTHY, AND L.J. GUILLETTE, JR. 1994. Development of a non-invasive sexing technique for hatchling loggerhead turtles (*Caretta caretta*). Page 30 in K.A. Bjorndal, A.B. Bolten, D.A. Johnson, and P.J. Eliazar, eds. *Proceedings of the Fourteenth Annual Symposium on Sea Turtle Biology and Conservation*. NOAA Technical Memorandum NMFS-SEFSC-351.
2. CRAIN, D.A., A.A. ROONEY, D.B. PICKFORD, AND L.J. GUILLETTE, JR. 1995. Aromatase activity in contaminant-exposed American alligator (*Alligator mississippiensis*) and red-eared slider (*Trachemys scripta elegans*) hatchlings. Presented at 38th Annual Meeting of the Society for the Study of Amphibians and Reptiles. Appalachian State University, Boone, N.C. August 8-13.
3. CRAIN, D.A., A.A. ROONEY, D.B. PICKFORD, AND L.J. GUILLETTE, JR. 1996. Endocrine disruption in juvenile American alligators (*Alligator mississippiensis*) exposed to environmental contaminants. Presented at Western Regional Conference on Comparative Endocrinology. University of California, Berkeley, CA. March 23-25.
4. CRAIN, D.A. 1996. The effects of endocrine-disrupting contaminants on aquatic wildlife. Presented at the American Waters Resources Association Conference. Orlando, FL. May 17.
5. CRAIN, D.A. AND L.J. GUILLETTE, JR. 1996. Structural and functional endocrine alterations in alligators exposed to two contemporary-use pesticides. Presented at "Health Effects of Contemporary-Use Pesticides: The Wildlife/Human Connection." Racine, Wisconsin. September 27-29, 1997.
6. CRAIN, D.A. 2006. Accelerated Climate Change: An East Tennessee Problem? Presented July 25, 2006 at the Volunteer Legacy Coalition Conference on Global Warming.
7. HEDDEN, H. AND D.A. CRAIN. The effects of atrazine on the gonads, larynx, and liver of *Xenopus laevis* tadpoles and juveniles: a histological and electron microscopy Study. National Environmental Public Health Conference, Atlanta, Georgia. December 2006.
8. HEDDEN, H. AND D.A. CRAIN. The effects of atrazine on the gonads, larynx, and liver of *Xenopus laevis* tadpoles and juveniles: a histological and electron microscopy study. Southeastern Partners in Amphibian and Reptile Conservation. Chattanooga, Tennessee. February 2007

## GRANTS RECEIVED

2005 Providing science teachers in grades 4-8 with equipment and strategies for implementing a science program that emphasizes discovery and exploration. \$41,000 from the Tennessee Title II Improving Teacher Quality Program. Co-PI with Dr. Terry Bunde and Dr. Terry Simpson (Project Director).

2002 Exploration of Vocation. Funding to examine my vocation, specifically exploring inclusion of primary research activities and the interaction of spiritual wisdom and scientific knowledge.

2002. Faculty Instructional Technology Fellowship. Funding to create a website for a freshman seminar course at Maryville College.

2001-2002. Center for Theology and Natural Sciences. \$10,000 for the establishment of a course that emphasizes the interactions of science and religion.

1998-2001. Environmental Protection Agency. \$23,023. Contracted for Stephen Threlkeld's EPA grant entitled Effects of Interacting Stressors in Agricultural Ecosystems.

1995-1997 Environmental Protection Agency Graduate Student Fellow, \$68,000<sup>00</sup>"The effects of endocrine-disrupting contaminants on the reproductive system of reptiles."

1994 American Museum of Natural History. Learner-Gray Grant, \$607<sup>00</sup>"Analysis of growth of marine turtles at Great Inagua, Bahamas."

1994 Division of Sponsored Research Grant, \$8,200<sup>00</sup>"The role of growth factors in reptilian reproduction."

1993 Sigma Xi Grant-in-Aid of Research,\$390<sup>00</sup>"Insulin-like Growth Factor-I and Growth Variation in Redbelly Slider Turtles (*Pseudemys nelsoni*)."