

DAVID ANDREW CRAIN

Professor of Biology

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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. Professor (2011-present), Associate Professor of Biology (2003-2011) and Assistant Professor of Biology (1998-2003), Division of Natural Sciences, Maryville College.

Lecturer and laboratory coordinator for Animal Physiology (BIO 412), Developmental Biology (BIO 414), Ornithology (BIO 403), Wildlife Photography (BIO 200), Human Anatomy and Physiology I (BIO 217), Human Anatomy and Physiology II (BIO 218), Vertebrate Zoology (SCI 150), Understanding Biology Through Food (SCI 150), and Fundamentals of Biology (Bio111).

Lecturer for Environmental Toxicology (SCI 350), Developmental Biology for non majors (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).

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.

January 1994 to December 1996. Teaching Assistant, University of Florida, Gainesville, FL. Introductory Biology Laboratory for Biology Majors, Director of the Comparative Chordate Embryology Laboratory for Zoology Majors, Director of the Animal Physiology Laboratory for Biology Majors.

Research Positions

- Professor (August 2011-present), Associate Professor (May 2003-2011) and Assistant Professor (August 1997-May 2003). Examining the effects of endocrine-altering substances on the reproduction of vertebrates.
- 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.
- Research Assistant. Effects of environmental contaminants on the reproduction of reptiles. Dr. Louis Guillette's Laboratory, U.F. May-August, 1995.
- Research Assistant. Identification of growth factors in reptiles. Dr. Louis Guillette's Laboratory, U.F. May-August, 1994.
- Lab Technician. Reproductive physiology and hormone assays. Laboratory for Biotechnologies for the Ecological, Evolutionary, and Conservation Sciences (BEECS), U.F. August-December, 1993.
- Research Supervisor. Loggerhead sea turtle conservation and education project. Pritchard's Island, S.C. University of South Carolina, Beaufort, S.C. May-August, 1992.
- 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.
- Field Researcher. Loggerhead sea turtle conservation and education project. Pritchard's Island, S.C. University of South Carolina, Beaufort. May-August, 1990.
- 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.

ARTICLES

- CRAIN, D.A.** 2019. Environmental ethics and motivations for Christians. *Biologos*. Published October 16, 2019. <https://biologos.org/articles/environmental-ethics-and-motivations-for-christians>
- CRAIN, D.A.** 2019. 5 Lessons learned from teaching college students about science and Christianity. *Biologos*. Published August 20, 2019. <https://biologos.org/articles/5-lessons-learned-from-teaching-college-students-about-science-and-christianity>
- CRAIN, D.A. AND M. HALE.** 2019. Pancake evolution: A novel and engaging illustration of natural selection. *The American Biology Teacher* 81: 110-114.
- WILSON, L.E., N.C DUNCAN, AND D.A. CRAIN.** 2017. Comparison of aquaponics and hydroponics on basil (*Ocimum basilicum*) morphometrics and essential oil composition," *RURALS: Review of Undergraduate Research in Agricultural and Life Sciences*: Vol. 11 : Is. 1 , Article 3. <http://digitalcommons.unl.edu/rurals/vol11/iss1/3>
- GIBLOCK, S.M. AND D.A. CRAIN.** 2013. Fiddler Crabs (*Uca pugnator*) as Bioindicators of Environmental Health in Coastal Estuarine Communities of Beaufort, South Carolina. *Southeastern Naturalist. Papers and Pubs.* Volume 2, Issue 1, Article 13. <http://digitalcommons.northgeorgia.edu/papersandpubs/vol2/iss1/13>
- VOM SAAL, F.S., B. AKINGBEMI, S. BELCHER, D.A. CRAIN, D. CREWS, L.GUIDICE, P.A. HUNT, C. LERANTH, MYERS, J.P., A. NADAL, N. OLEA, V. PADMANABHAN, C. ROSENFELD, A. SCHNEYER, G. SCHOENFELDER, C. SONNESCHEIN, A.M. SOTO, R. W. STAHLHUT, S. SWANN, L.V. VANDENBURG, H. WANG, C.S. WATSON, W.V. WELSHONS, R.T. ZOELLER.** 2010. Flawed experimental design reveals the need for guidelines requiring appropriate positive controls in endocrine disruption research. *Toxicological Sciences* 115(2):612-3.
- MYERS, J.P., B. AKINGBEMI, K. ARIZONO, S. BELCHER, T. COLBORN, D.A. CRAIN, F. FARABOLLINI, L.J. GUILLETTE, S. HO, P.A. HUNT, T. IGUCHI, S. JOBLING, J. KANNO, H. LAUFER, M. MARCUS, J.A. MCLACHLAN, A. NADAL, J. OEHLMANN, N. OLEA, P.**

- PALANZA, S. PARMIGIANI, B.S. RUBIN, G. SCHOENFELDER, C. SONNESCHEIN, A.M. SOTO, J.A. TAYLOR, L.V. VANDENBURG, J.G. VANDENBERGH, C.S. WATSON, W.V. WELSHONS, R.T. ZOELLER, F.S. VOM SAAL. 2009. Why public health agencies cannot depend upon good laboratory practices as a criterion for selecting data: The case of bisphenol-A. *Environmental Health Perspectives* 117: 309-315.
- CRAIN, D.A.**, S.J. JANSSEN, T.M. EDWARDS, J. HEINDEL, S. HO, P. HUNT, T. IGUCHI, A. JUUL, J. A. MCLACHLAN, J. SCHWARTZ, N. SKAKKEBAEK, A.M. SOTO, S. SWAN, C. WALKER, T. WOODRUFF, T. WOODRUFF, L.C. GIUDICE, L. J. GUILLETTE. 2008. Female Reproductive disorders: The roles of endocrine disrupting compounds and developmental timing. *Fertility and Sterility* 90: 911-940.
- FLOYD, R.H., J. WADE, AND **D.A. CRAIN**. 2008. Differential acute sensitivity of wild *Rana sylvatica* and laboratory *Xenopus laevis* tadpoles to the herbicide atrazine. *Bios* 79:115-119.
- CRAIN, D.A.**, M. ERIKSEN, T. IGUCHI, S. JOBLING, H. LAUFER, G. LEBLANC, L.J. GUILLETTE, JR. 2007. An ecological assessment of bisphenol-A: Evidence from comparative Biology. *Reproductive Toxicology* 24:225-239.
- VOM SAAL, F.S., B. AKINGBEMI, S. BELCHER, L. BIRNBAUM, **D. CRAIN** et al. 2007. Chapel Hill bisphenol A expert panel consensus statement: Integration of mechanisms, effects in animals and potential impact human health at current levels of exposure. *Reproductive Toxicology* 24: 131-138.
- WEBB, C.M. AND **D.A. CRAIN**. 2006. Effects of ecologically relevant doses of malathion on developing *Xenopus laevis* tadpoles. *Bios* 77: 1-6.
- 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.
- HEWITT, E.A., **D.A. 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.
- 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 (T₄) concentrations in juvenile alligators collected from Lake Okeechobee and the northern everglades, Florida, USA. *Environmental Toxicology and Chemistry* 21: 914-921.
- GUILLETTE, L., **D.A. 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.
- 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.
- 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.
- 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.
- CRAIN, D.A.** AND L.J. GUILLETTE, JR. 1998. Reptiles as models of contaminant-induced endocrine disruption. *Animal Reproduction Science* 53: 77-86.
- 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.
- 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.
- 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.
- 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.
- 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.
- CRAIN, D.A.** AND L.J. GUILLETTE. 1997. Endocrine-disrupting contaminants and reproduction in wildlife. *Reviews in Toxicology* 1: 207-231.
- 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.
- 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.
- 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.
- GUILLETTE, L.J., JR., AND **D.A. CRAIN**. 1996. Endocrine-disrupting contaminants and reproductive abnormalities in reptiles. *Comments on Toxicology* 5: 381-399.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.

BOOKS

- CRAIN, D.A.** 2020. *Science and Christianity: Past, Present, and Future*. A Group Study. Smyth & Helwys Books. 62 pgs.
- CRAIN, D.A.** 2019. *Science and Christianity: Past, Present, and Future*. A Group Study. Maryville College Press, Knoxville, TN, 66 pgs. <http://www.maryvillecollege.edu/science&christianity>

- CRAIN, D.A.** 2015. Cades Cove Wildlife: A Visitor's Guide. E-book created for non-majors biology class. 130 pages.
- GUILLETTE, L.J., AND **D. CRAIN**, editors. 2000. Environmental Endocrine Disruptors: An Evolutionary Perspective. Taylor and Francis, New York, NY, 355 pgs.

BOOK CHAPTERS

- 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.
- 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.
- 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.
- GUILLETTE, L.J. JR., 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, ASTM STP 1364, D.S. Henshel, M.C. Black, and M.C. Harrass, Eds., American Society for Testing and Materials, West Conshohocken, PA, pp.254-270.
- GUILLETTE, L.J. JR., **D.A. CRAIN**, A.A. ROONEY, E.F. ORLANDO AND A.R. WOODWARD. 1998. Ecoestrogens and Alligator Embryos. In "Proceedings of the Inauguration of the Centre for Reproductive Biology. Special topic: Reproduction and Environment". H. Andersson, H. Kindahl, M. Neil, Eds. CBR Report 1, Swedish University of Agricultural Sciences, Uppsala. pp. 7-24.
- 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. In "Principles and Processes for Evaluating Endocrine Disruption in Wildlife". R. Kendall, R. Dickerson, J. Giesy and W. Suk, Eds. SETAC Pr., Pensacola, FL, pp. 267-289.
- GUILLETTE, L.J. JR., **D.A. CRAIN**, A.A. ROONEY, D.B. PICKFORD, E.F. ORLANDO. 1997. Ecoestrogen-induced abnormalities of reptilian embryonic development. In "Advances in Comparative Endocrinology". S. Kawashima and S. Kikuyama, eds. Monduzzi Editore, Bologna, pp. 1717-1721.

PAPERS PRESENTED

- CRAIN, D.A.** 2019. Effects of Endocrine Disrupting Contaminants on Wildlife: Evidence from Biochemistry, Physiology, and Ecology. Inaugural speaker for the Environmental Speaker Series. Berry College, Rome, Georgia. September 27, 2019.
- BRUMBAUGH, A., **D. CRAIN**, C. WILLIAMS, L.J. GUILLETTE, D.D. SPYROPOULOS, AND S. KOHNO. 2016. Obesogenic Activity of Oil Dispersant Corexit 9500 in the American Alligator. 2016 Oil Spill and Ecosystem Science conference in Tampa, Florida. February 1-4, 2016.
- JASON E. JOHNSON, JODI A. JANS, JENNIE CLARK, VICTOR BRIDGES, **D. ANDREW CRAIN**, et al. 2012. Factors Associated with 30-Day Readmission after Coronary Artery Bypass Graft Surgery. American College of Surgeons, Tennessee Chapter, Chattanooga, Tn. August 2-5, 2012.
- CRAIN, D.A.**, M. HALE, AND M. HOLT. 2011. Using food and YouTube to create an engaging non-

majors biology class. Appalachian College Association Summit, Asheville, N.C. October 14-15, 2011.

- CRAIN, D.A.** 2011. Balancing Religion and Science: A Response to Susan Trollinger. Maryville College. September 30, 2011. Pgs. 51-54 in Proceedings of The Maryville Symposium, Conversations on Faith and the Liberal Arts, The Book, Texts and the Liberal Arts.
- CRAIN, D.A.** 2011. Transformational Undergraduate Research at Small Liberal Arts Colleges. Blue Ridge Undergraduate Research Conference Plenary Address. Maryville College, Maryville, Tn. March 25, 2011.
- CRAIN, D.A.** 2010. Water Pollution and Aquatic Life: Baby steps toward greening our planet. Great Smoky Mountains National Park Spring Wildflower Pilgrimage. Gatlinburg, Tn. April 23, 2010.
- CRAIN, D.A.** 2009. Endocrine Disrupting Compounds: Wildlife as Sentinels for Human Health. Science Colloquium Plenary Address. Francis Marion University, Florence, S.C. April 24, 2009.
- CRAIN, D.A.** 2009. Cades Cove Wildlife: Past, Present, and Future. Blount County Dental Association. January 20, 2009.
- CRAIN, D.A.** 2008. Scientific perspective on Holmes Rolston's environmental ethics. Maryville College. September 26, 2008. Pgs. 27-31 in Proceedings of The Maryville Symposium, Conversations on Faith and the Liberal Arts, Discerning a Moral Environmental Ethic.
- CRAIN, D.A., E. FRENCH, L. HILL.** 2007. High-quality research at a small liberal arts college: why and how. Appalachian College Association Summit, Abingdon, Virginia. October 20, 2007.
- HEDDEN, H., AND D.A. CRAIN.** 2007. 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.
- HEDDEN, H., AND D.A. CRAIN.** 2006. 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.
- CRAIN, D.A.** 2006. Accelerated Climate Change: An East Tennessee Problem? Presented July 25, 2006 at the Volunteer Legacy Coalition Conference on Global Warming.
- CRAIN, D.A. AND L.J. GUILLETTE, JR.** 1997. 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.
- 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, 1996.
- 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.
- 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.
- CRAIN, D.A., T.S. GROSS, K.A. BJORN DAL, A.B. BOLTEN, R. CATHY, 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.

RESEARCH ADVISOR FOR UNDERGRADUATE RESEARCH

- Bryan Crouser. Effects of cannabidiol (CBD) on the liver and thyroid of wood frogs (*Lithobates sylvatica*). January 2020-present.
- Kelsey Birchfield. The effects of cannabidiol (CBD) on development of the cardiovascular system of the wood frog (*Lithobates sylvatica*). January 2020-present.
- McCall Smallwood. Comparison of aquaponics and traditional cultivation on basil (*Ocimum basilicum*). January 2020-present.
- Charis Ramsey. The effects of therapeutic shoeing involving enhancement of the digital cushion and de-rotation of the P3 (coffin bone) on vasodilation of the palmar digital arteries, pain relief, and endocrine values in laminitic horses. August 2019-present.
- Kai Miettinen. Correlation of high carbohydrate diet and performance among division 3 college soccer athletes. August 2019-present.
- Heather Ellis. Assessment of canine obesity in small animal veterinary practices. January 2019-present.
- Miracle Walls. The effects of epigallocatechin-3-gallate on liver histology of goldfish (*Carassius auratus*) and African clawed frog tadpoles (*Xenopus laevis*). January 2019-present.
- Keonna Tisdale. Effect of lead on chick (*Gallus gallus*) development. January 2019-May 2019.
- Chloe Kilpatrick. Effects of 17 α -ethinylestradiol on *Danio rerio* hepatosomatic index and liver composition. Co-advisor with Dr. Jerilyn Swann. January 2017-May 2017.
- Kristin Rolston. The effects of household cleaners on the integument of *Anolis carolinensis*. January 2017-December 2017.
- Rachel Taylor. Exposure to retinoic acid influences the development and structure of planarian eyes. January 2017-December 2017.
- Lauren Wilson. Comparison of aquaponics and hydroponics on basil (*Ocimum basilicum*) morphometrics and essential oil composition. August 2016-May 2017.
- Brooke Cummings. Cryopreservation of *Danio rerio*: Determining the embryonic stage of development and cryoprotectant that yields the highest hatching rate. January 2016-December 2016.
- Amelia Brumbaugh. Crude oil dispersants and reptile endocrine disruption. Summer 2015-present.
- Maddie Coker. Thyroxine and Triiodothyronine treatments for hypothyroidism: Summer 2015-present.
- Hannah Cummings. *Tagetes patula* as a companion plant in East Tennessee *Phaseolus vulgaris* cultivation. January 2015-December 2015.
- Arielle Dolan. Effects of temperature on growth, color, and behavior in *Betta splendens*. January 2015-present.
- Lauren Evans. Quantification of firefly luciferase using SDS-PAGE followed by densitometry. August 2013-May 2014.
- Mallory Kirkland. Effects of antiepileptic medication valproic acid sodium salt on the bone mineral density in *Xenopus laevis*. January 2013-December 2013.
- Brittany Neff. The effects of equine-assisted psychotherapy stress of the horse: Measuring cortisol, pulse, respiration, and behavioral differences before and after clinical sessions. January 2013-Dec. 2013.
- Austin Armstrong. Sensitivity of *Xenopus laevis* tadpoles to the herbicide 2,4 Dichlorophenoxyacetic acid. August 2012-May 2013.
- Nicole McNabb. Effects of the antibiotic Baytril on gastrointestinal morphology and intestinal flora in metamorphosing *Xenopus laevis* tadpoles. January 2012-December 2012.
- Courtney Phillips. Effects of the antibiotic Baytril on cartilage formation in metamorphosing *Xenopus laevis* tadpoles. January 2012-December 2012.

Amanda Burchett. Habitat selection and reproductive success of Eastern worm snakes (*Carphophis amoenus*) in east Tennessee. January 2012-December 2012.

Shelby O'Brien. The physiological and behavioral effects of salinity on *Betta splendens*. January 2012-December 2012.

Adam Patterson. Effect of small-scale disturbance on terrestrial fauna in the Maryville College woods. May 2011-December 2011.

Steven Giblock. Fiddler crabs (*Uca pugilator*) as bioindicators of environmental health in coastal estuarine communities of Beaufort, S.C. January 2011-December 2011. www.youtube.com/MCBiology

Jason Johnson. Significant comorbidity factors leading to readmission after coronary artery bypass grafting. January 2011-December 2011.

Hillary Brown. Investigation of altering bone density caused by anticonvulsant drug therapy in *Rana sylvatica* tadpoles through histological analysis. January 2010-December 2010.

Shelley Clark. The influence of BMI on rehabilitation time after total knee replacement. January 2010-December 2010.

Hope Marlow. The effects of ultraviolet irradiation on Zebrafish (*Danio rerio*) lens ontogeny. January 2010-December 2010.

Kyle Chewing. Teaching Taxonomy, Thermoregulatory Behavior, and Photoperiod Effects using Laboratory Observations of *Anolis carolinensis*. January 2009-December 2009.

Rebekah Moore. The sustainability and further testing recommendations of home water treatment facilities in Buffalo Creek, Tennessee. January 2009- December 2009.

Anna McRee. Comparison of the effect of dietary changes or dirloptamide treatment on canine obesity in a small animal veterinary practice. January 2009- December 2009.

Erin French. Behavioral and physiological stress response in Wilson's tree frogs exposed to household stressors. January 2007-December 2008.

Lindsey Hill. Influence of soy-derived genistein on the thyroid and ovarian axis in *Xenopus laevis* tadpoles. January 2007-December 2008.

Charlotte Taylor. Liver histopathology in *Xenopus laevis* tadpoles after exposure to thyroid-altering medications. January 2007- December 2008.

Maki Ishida. Efficacy of herbal medicines compared to conventional antibiotics. August 2006-May 2007.

Angie Castle. Metabolic rate in *Xenopus laevis* tadpoles exposed to various thyroid-altering medications. August 2006- May 2007.

Jessica Kitchens. The influence of temperature and time on results of the comprehensive metabolic panel (CMP) for human blood samples. January 2006- December 2006.

William McCurdy. The influence of staggered exposure to fluoxetine on aggressive behaviors in Siamese fighting fish (*Betta splendens*). January 2006-December 2006.

Rhiannon Foust. Effect of diet on circadian rhythmicity in Zebrafish (*Danio rerio*). January 2006-December 2006.

Austin Mackens. Effects of atrazine on testis development in *Xenopus laevis*. January 2005-Dec.2005.

Travis Groth. Effects of atrazine on ovary development in *Xenopus laevis*. January 2005- December 2005.

Ginger Lovingood. Effects of atrazine on larynx development in *Xenopus laevis*. January 2005- December 2005.

Ivy Parsons. The effects of fluoxetine on Siamese fighting fish (*Betta splendens*). August 2004- December 2005.

Elizabeth Rushworth. Variables that affect the incidence of bilateral tears in the anterior cruciate ligaments. August 2004-December 2004.

Jenny Wilson. Effects of atrazine and ethinylestradiol on *Xenopus laevis* tadpoles. January 2004-December 2004.

Chris Lehman. Use of IDEXX C6 ELISA for detection of Lyme disease in dogs of a non-endemic area. January 2004-December 2004.

Lauren Butz. Testicular growth and testosterone concentrations in rainbow trout (*Oncorhynchus mykiss*) exposed to an environmental endocrine disruptor. August 2003 to May 2003.

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

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

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

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

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

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

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

Monica Hawkins. Thyroid abnormalities in tadpoles exposed to organophosphate insecticides. January 2001 to May 2002.

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

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

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

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

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

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

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

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

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

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

Jennifer Windrow. A study of captive-born female white rhinoceroses and their mating behaviors.

Maryville College. August-December, 1998.

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

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

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

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

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

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

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

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

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

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

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

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

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

INSTRUCTIONAL TEACHING FOR PROFESSIONALS

Oak Ridge Institute for Continued Learning (ORICL). Introduction to constructive dialogue on topics at the intersection of science and Christianity. March 24, 2020.

College and University Professors. Instructional support for teaching non-major biology courses in an effective way. University of Alabama Huntsville. September, 2015.

High School and Middle School Science teachers. Helped facilitate the Tennessee Department of Education develop a resource-based website so that primary and secondary Tennessee science teachers can meet new state and national education standards. www.tncurriculumcenter.org/science Maryville College. July 11-15, 2011.

High School and Middle School Science Teachers. Provided Blount County, Fentress County Tennessee science teachers with content and pedagogical strategies for the topics of evolution, animal form and function, biotechnology, environmental pollutants, accelerated climate change, animal reproduction, bioengineering, and population dynamics. July 7-11, 2008; July 13-17, 2009; July 12-16, 2010.

High School and Middle School Science Teachers. Provided Monroe County science teachers strategies for using low-cost technology to meet Tennessee State Science Standards. Co-instructor with Dr. Terry Simpson. August 6, 2007.

Middle School Science Teachers. Provided science teachers in grades 4-8 with equipment and strategies for implementing science programs emphasizing discovery and exploration. Co-instructor with Dr. Terry Simpson and Dr. Terry Bunde. Summer, 2005.

Tamatha Barbareau. PhD candidate. University of Florida. Insulin-like growth factor hormones in the

plasma of *Rana* and *Xenopus laevis* frogs. August 2002.

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

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

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.

Mumtaz Pesha. U.S. Environmental Protection Agency Regional Research Director. Techniques in analysis of steroid hormones in fish species. May, 1995.

PROFESSIONAL SERVICE & HONORS

Leader. "Maryville College Riparian Zone Restoration." Led MC students, faculty, and community members in removal of invasive/exotic plants and planting of natives. Saturday, February 22, 2020.

Presenter. "The Maryville College Orchards: Past, Present, and Future." Blount County Library. February Blount County Master Gardener's meeting. February 27, 2020.

Board Member. TBF Foundation. <http://www.tbffoundation.org/>. Spring 2018-January 2020.

Manuscript Reviewer for the following journals: *American Biology Teacher*, *Biological Conservation*, *Chemosphere*, *Environmental Toxicology and Chemistry*, *Environmental Health Perspectives*, *Journal of Herpetology*, *Herpetologica*, *ZooBiology*,. 1999-Present.

Presenter. "Science & Christianity: A Guide to Study this Topic." St. Paul Lutheran Church, Maryville, Tn. September 5, 2019.

MC Wildlife Photography Calendar. Compiled and coordinated photos and copy for the 2014-2015, 2015-2016, 2017-2018, 2019-2020. "Beauty In Our Backyard" calendars that feature photos and stories of MC students.

Presenter. "Science & Christianity: A Guide to Study this Topic." Second Presbyterian Church, Knoxville, Tn. June 2, 2019.

Coordinator, Lead Gardener. Maryville College Gardens and Orchards. Establish, plant, maintain, and harvest vegetables and fruits on the Maryville College campus for the Margaret Ware Dining Hall. 2008-present.

Presenter. "Science & Christianity: An Overview for Your Sunday School Classes." New Providence Presbyterian Church, Maryville, Tn. April 28, 2019.

Author. "Maryville College History Hikes." A trifold pamphlet to promote hiking in the Great Smoky Mountains National Park. April, 2019.

Chair, The Maryville College Woods Group. Responsible for developing and implementing a "100 Year College Woods Plan" for the 140-acre MC woods. See www.maryvillecollege.edu/woods. October 2012-present.

Presenter. "Science & Christianity: Past, Present, Future." Board of Church Visitors, Maryville College. March 26, 2019.

Presenter. "Science & Christianity: Past, Present, Future." Blount County Ecumenical Association. Maryville, TN. March 26, 2019.

Chair, Maryville College Bicentennial Celebration Curricular and Co-Curricular Committee. Spring 2017-2019.

Presenter. "RT Lodge & Maryville College Fireside Chat: A discussion of professional activities." November 5, 2018.

Chair, MC Institutional Animal Care and Use Committee (IACUC). August 2008-January 2018.

Presenter. "Seeing God in the Wilderness." New Providence Presbyterian Church, First Baptist Church, Maryville, Tn. Fall, 2017.

Baccalaureate Speaker. "Being salt and light after graduation." Maryville High School. May 14, 2015.

Teacher of the Year. Maryville College faculty honor. May, 2015.

Runner-up Teacher of the Year. Maryville College faculty honor. May, 2004, 2013, 2014.

Little River Blueways Map. Assisted in the writing, production, and distribution of the first ever Little River Watershed Blueways Map.
https://static1.squarespace.com/static/59b01f3e12abd9eb6c2260cb/t/5a95b6e9419202af2b58b4b2/1519761143248/LRWA_Blueways_Map.pdf

Board Member and Vice President. Little River Watershed Association. Spring, 2013-2016.

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

Leader of photography workshops. Vienna Coffee House and Great Smoky Mountains National Park. Spring, 2014

Co-Chair, MC Strategic Plan Environmental Stewardship Committee. July 2011-Fall 2012.

Undergraduate Research Initiative. 2006-present. In response to the senior thesis review task force, I was asked by Dean Naylor to spearhead an emphasis on highlighting our excellent undergraduate research program. This resulted in the current website (See www.maryvillecollege.edu/academics/learn-by-experience/research, rotating features, and updated procedures for highlighting exemplary studies (see Tartan, Senior Study, Lessons).

Presenter for prospective Maryville College students and parents. "Undergraduate Research at Maryville College", "Natural Sciences at Maryville College, and "Academics at Maryville College." Saturday, Meet Maryville Presentations; Fall 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015.

Presenter for Maryville College alumni and donors. "Teaching Biology at Maryville College: Location, Location, Location", "Education outside the classroom" and "The Maryville College Orchard Project." 2012, 2013, 2014, 2015.

Member, Maryville College Honors Task Force. This group developed a plan for instituting an Honors Program at Maryville College. January 2009-April 2010.

Student photos featured. The Knoxville News Sentinel reporter Morgan Simmons featured photos of the 2010 Wildlife Photography class. See <http://www.knoxnews.com/news/2010/jan/23/snap-decisions/>.

Member, Academic Life Council, Maryville College. This committee shapes policies and procedures for the academic program at Maryville College. August 2006-May 2009.

Chapel leader. "Seeing with good eyes and binocular vision." Maryville College. September 8, 2009.

Reviewer. Girl, Disrupted: Hormone Disruptors and Women's Reproductive Health. A report on the women's reproductive health and the Environment Workshop. January, 2009.
www.healthandenvironment.org/reprohealthworkshop

Member, Maryville College Human and Animal Use Committee. Reviewer for all animal use proposals. August 1998-August 2008.

Presenter of "Toxicants, Science and Politics: How much risk are we willing to take?" Science Literacy Lecture presented to the MC community on October 21, 2008. Co-presenter with Dr. Mark O'Gorman.

In-service workshop leader for Blount County, Tennessee, high school and middle school science teachers. July 7-11, 2008.

Leader of biology presentations for local elementary schools and local scout troops. August 2000-present.

Editor. FRS130 Perspectives on the Environment Reader, 2006-2007 edition. XanEdu Publishing. 102 pages.

In-service workshop leader for Monroe County Schools. Science curriculum that emphasizes discovery and exploration. Sequoia High School. August 6, 2007.

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 February 2007.

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

Spirit of the Covenant Award. Maryville College award for the individuals that best model the MC Covenant. April 27, 2006.

Maryville College Faculty Hearings and Appeals Committee. August 2004 to 2006.

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

Member, Foundations of Excellence Task Force. The task force is charged with evaluating and improving the Maryville College first year experience. August 2003 to February 2007.

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.

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

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

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

Presenter for Maryville High School AP Environmental Science. "A small dose of toxicology." October 20, 2014.

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.

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

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

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

Member of the Maryville College Window of Opportunity Resources for Excellence Group. 2001-2002.

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

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

GRANTS RECEIVED

- 2020 Tennessee Wildlife Resources Association (TWRA) Riparian Zone Restoration Grant. \$500. This grant will fund removal of invasive exotics and plant native vegetation along Duncan Branch in the Maryville College Woods.
- 2019 Promotion of Science & Christianity Study Guide. \$6,971.99. This project funded (1) the writing of two papers that will lead readers to the study guide, (2) editing an electronic 2nd edition of the guide, and (3) exploration of potential publishers to publish the second edition. Funded by TBFmission.org.

- 2018 Science & Christianity Study Guide. \$19,748. This project sought to alleviate two problems: (1) people leaving the church because they choose science and (2) people dismissing science because they choose faith. The methodology for the study guide focused attention on effectively communicating science and faith, and a study of regional differences in acceptance of science and faith discussions. Spring & Summer, 2018. Funded by TBFmission.org.
- 2018 Sabbatical Leave from January-May, 2018. Granted time away from teaching obligations to complete three projects: (1) publication of a teaching lab that I created several years ago, (2) promoting sustainable agriculture at MC, and (3) publication and distribution of a Science and Christianity Study Guide.
- 2015 Naylor Grant. \$3879.52 Maryville College Fund to assist Maryville College student Hannah Cummings in her senior study project to examine the effect of companion plants on native green beans. Summer, 2015.
- 2012 MC Orchard Fund. \$1,500 to accentuate the Maryville College Orchard plots.
- 2012 Calvin College grant sponsored by the Issachar Fund Initiative to fund participation in a two-week seminar entitled "Religion, Modernity, and the Hermeneutics of Science." July 8-20, 2012.
- 2011 MC Undergraduate Science Education and Research Institute. One of three PIs in a \$300,000 summer research grant from the U.S. Department of Education.
- 2011 Gibson Fund Grant. \$3,000 grant to establish the Maryville College Orchard and Berry Plots.
- 2011 Department of Education grant to be a higher-education advisor for how primary and secondary Tennessee science teachers can meet new state and national education standards. Under the leadership of Dr. Terry Simpson. July 11-15, 2011.
- 2010 East Tennessee Math Science Partnership. \$3,600 grant (+\$1,000 supplies) from the U.S. Department of Education to instruct Fentress and Blount County Science Teachers in a week-long workshop. Under the leadership of Dr. Terry Simpson. July 12-16, 2010.
- 2009 East Tennessee Math Science Partnership. \$3,600 grant (+\$1,000 supplies) from the U.S. Department of Education to instruct Fentress and Blount County Science Teachers in a week-long workshop. Under the leadership of Dr. Terry Simpson. July 13-17, 2009.
- 2008 East Tennessee Math Science Partnership. \$3,600 grant (+\$1,000 supplies) from the U.S. Department of Education to instruct Blount County Science Teachers in a week-long workshop. Under the leadership of Dr. Terry Simpson. July 7-11, 2008.
- 2008 Sabbatical Leave from January-May, 2008. Granted time away from teaching obligations to complete two large projects: (1) completion of a guide to wildlife of Cades Cove and (2) completion of a paper reviewing the role of environmental contaminants on female reproductive disorders. Funding for the former project was provided by a \$690 grant from the Parker Fund and Maryville College.
- 2008 Collaborative on Health and the Environment. \$10,000 grant from John Burbank and Alison Carlson, The Barbara Smith Fund, The Johnson Family Foundation, The New York Community Trust and Turner Foundation to write a comprehensive paper on the role of environmental contaminants on women's reproductive disorders and to organize a meeting of experts in the field.
- 2006 National Institutes of Health. \$2,000 grant (+ travel and lodging expenses) from the National Institute of Environmental Health Services (a branch of the NIH) to write a white paper for the Chapel Hill Bisphenol-A conference.
- 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 to analyze samples from Stephen Threlkeld's EPA grant entitled Effects of Interacting Stressors in Agricultural Ecosystems.
- 1995-1997 Environmental Protection Agency Graduate Student Fellow, \$68,000 ⁰⁰"The effects of endocrine-disrupting contaminants on the reproductive system of reptiles."
- 1994 American Museum of Natural History. Learner-Gray Grant, \$607 ⁰⁰"Analysis of growth of marine turtles at Great Inagua, Bahamas."
- 1994 Division of Sponsored Research Grant, \$8,200 ⁰⁰"The role of growth factors in reptilian reproduction." University of Florida, Gainesville, Fl.
- 1993 Sigma Xi Grant-in-Aid of Research, \$390 ⁰⁰"Insulin-like Growth Factor-I and Growth Variation in Redbelly Slider Turtles (*Pseudemys nelsoni*)."

Web Media Productions

Flickr Photos: <http://www.flickr.com/photos/46540890@N06/>

YouTube Channels: <https://www.youtube.com/channel/UCjqIMDWZHLQwXKqQ5o78qg>
<https://www.youtube.com/user/MCBiology/>
<https://www.youtube.com/user/DrDrewCrain/>

Representative Videos Produced:

- Wildlife Photography Class 2019: <https://www.youtube.com/watch?v=7eehvs3WpZA>
- Mountains to Sea 2017: <https://www.youtube.com/watch?v=5Vlx6tFACLY&feature=youtu.be>
- Wildlife Photography Class 2017: https://www.youtube.com/watch?v=nmy_jcihsKI
- Wildlife Photography Class 2016: <https://www.youtube.com/watch?v=vTqElGjGml8>
- Wildlife Photography Class 2015: <https://www.youtube.com/watch?v=7tWSVPkHMZM&feature=youtu.be>
- Biology, Charleston, S.C. 2014: <https://www.youtube.com/watch?v=mAWcQ5vNIW0&feature=youtu.be>
- Wildlife Photography Class 2014: <https://www.youtube.com/watch?v=xwF9pCJwxjc&feature=youtu.be>
- Wildlife Photography Class 2013: https://www.youtube.com/watch?v=28g-lmsU_VY
- Ornithology Florida Trip 2013: <https://www.youtube.com/watch?v=H7PIVkJjFWw>
- Science for Non-science majors 2013: <https://www.youtube.com/watch?v=zmvs2ETKdjM>
- Wildlife Photography Class 2012: <https://www.youtube.com/watch?v=tIOYMWgYRY0>
- Science for Non-science majors 2012: <https://www.youtube.com/watch?v=H3VORCD7gqk>

Representative Videos Highlighting Projects:

Science and Christianity:

https://www.youtube.com/channel/UCemDRNIFJ4JdUAohI8mJA2g?view_as=subscriber

Pre-med undergraduate research: <https://www.youtube.com/watch?v=1dWXBWbp-yQ>

Maryville College Orchard: <https://www.youtube.com/watch?v=p-PXAcWScSE>

Maryville College Garden: https://www.youtube.com/watch?v=Jex7BF_Z_uw