

Markus Hecker

Curriculum Vitae

July, 2007

BORN: Neuss, Germany; October 26th, 1970

CITIZENSHIP: Germany

LANGUAGES: German, English, Spanish

FAMILY: Wife: Ulrike Theresia Barth; married: July 11th, 1998
Son: Jan Hecker; born: March 5th, 1999
Daughter: Hanna Hecker; born: June 7th, 2003

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PRESENT POSITION: Project Scientist, ENTRIX, Inc
Adjunct Professor (Toxicology Centre), University of
Saskatchewan
Adjunct Professor (Department of Zoology), Michigan State
University

CERTIFICATIONS: Sportskipper license for inland and coastal waters
Scuba Certification CMAS

EDUCATION:

- 1991-1996 Student at the Universities Frankfurt (a. M.), Münster and Hamburg, Germany. Basic studies in biology, chemistry and physics; graduate studies in hydrobiology and fisheries, zoology and biochemistry
- 1994 Project study on wastewater treatment in Concepcion, Chile
- 1996 Diploma examination in hydrobiology and fisheries, zoology & biochemistry
- 1997 Diploma thesis in aquatic ecotoxicology at the Institute of Hydrobiology and Fisheries Science at the University of Hamburg: “Application of SPMDs to investigate the contamination of aquatic systems with organic pollutants” (cooperation with the Institute of Organic Chemistry, University of Hamburg)
- 1997 - 2001 Ph.D. research fellow at the Institute of Hydrobiology and Fisheries Science, Hamburg
- 2001 Ph.D. thesis: “Natural variability of endocrine and reproductive functions and their modulation by anthropogenic influences – investigations of the bream (*Abramis brama* [L.]) along the river Elbe and at a reference site”

POSITIONS HELD:

University of Hamburg

1997 – 2002: Research associate (Marine & Fresh Water Toxicology) at the Institute of Hydrobiology and Fisheries Science

Michigan State University

2002 – 2007: Research associate/Assistant Professor (Aquatic Toxicology) at the National Food Safety & Toxicology Center

ENTRIX, Inc.

2004 – 2007: Assistant Scientific Consultant

2007 –current: Project Scientist

RESEARCH INTERESTS:

- Vertebrate and invertebrate endocrinology and physiology
- Natural variability of biomarker responses under real world conditions, and their modulation by changing ecological (habitat) conditions with a focus on endocrine and related reproductive processes.
- Identification of biological effects of environmental contaminants in wild animals.
- Evaluation of the observed phenomena with respect to their relevance for environmental and human health aspects.
- Interactions between eutrophication and contamination.

- Interactions between parasitism and contamination.
- Elucidation of mechanisms of contaminant action.
- Identification of cause effect relationships under complex exposure situations.
- Mechanisms of interactions at different levels of organization (from molecules to populations).
- Use of proteomic, genomic and biochemical techniques to identify and evaluate exposure to environmental contaminants.
- Environmental risk assessment.

EXPERIENCES:

- Proposal writing
- Project management
- Report writing
- Coordination and management of field campaigns
- Coordination and management of laboratory research projects
- Coordination and management of international multi-laboratory studies
- Communication and interaction with agencies and professional institutions
- Communication of research strategies and data
- Supervising of undergraduate and graduate Students
- Teaching undergraduate and graduate classes
- Litigation support
- Test validation at the national (e.g. US-EPA) and international (OECD) level

Projects:

1993 – 1995: (student activities): DFG-Project: “Communities, adaptive responses of biota and toxic effects along the upper and intermediate river Elbe (BIOTOX Elbe)”

1997 – 2000: **Project Manager:** National program “Environmental Hormones” of the German Environmental Protection Agency (UBA): “Ecotoxicological relevance of endocrine reactive compounds in the aquatic environment. Field studies along the river Elbe as a model system.” (Total funding approx. 170,000 US\$)

1997 – 2002: **Project Manager/Study Director:** CEFIC/EMSG research project: “Endocrine modulating effects in fish along the river Elbe and in reference areas. Assessment of risks related to the habitat conditions and the natural variability of endocrine functions” (Total funding approx. 160,000 US\$)

2002 – 2005: ECORISK research projects (Total funding approx. 950,000 US\$):

- **Study Director:** “Investigation of methods to study the potential mechanisms of action of atrazine in adult and metamorphosing amphibians: Including *Xenopus laevis* and frog species collected from Michigan field sites. (MSU 01)”
- **Project Manager:** “Histology of the gonads and analysis of hormone levels in the native green frog (*Rana clamitans*) and other incidental ranid species collected from field sites in Michigan” (MSU 02) (Total funding approx. 344,536 US\$)
- **Study Director:** “A pilot study of response of larval *Rana clamitans* to atrazine exposure assessment of metamorphosis and gonadal and laryngeal morphology and selected hormones and enzyme activities. (MSU 03)”
- **Study Director:** “Response of *Xenopus laevis* to atrazine exposure: assessment of the mechanism of action of atrazine .(MSU 04)”
- **Project Manager:** “South African Analytical Support – Hormone and Aromatase Analysis (SA-01C). (MSU 07)”
- **Study Director:** “Effects of the herbicide atrazine on adult *Xenopus laevis*: Identification of possible hypothalamic and other modes of action. (MSU 08)”
- **Project Manager:** “Seasonal Fluctuation in the Reproductive Cycle of *Xenopus laevis* Under Field Conditions in South Africa. (SA 01E/MSU 09)”

2004-2006: US-EPA (894,050 US\$)

- **Co-Principle Investigator/Study Coordinator:** “Development of an assay using the H295R cell line to identify chemical modulators of steroidogenesis and aromatase activity.”

2004-2007: US-EPA STAR Grant (749,904 US\$)

- **Co-Principle Investigator:** “Chemical induced Changes in Gene Expression Patterns Along the HPG-axis at Different Organizational Levels Using a Small Animal Model (Japanese medaka)”

2006-current: US-EPA (507,327 US\$)

- **Co-Principle Investigator/Study Coordinator:** “Standardization and Refinement of the H295R Cell Based Assay to Identify Chemical Modulators of Steroidogenesis and Aromatase Activity”

2007 – current: Pillsbury Winthrop, Shaw & Pittman. LLP

- **Co-Principle Investigator/Study Coordinator/Study Manager:** “Toxicological Assessment of White Sturgeon (*Acipenser transmontana*) Early Life Stages Exposed to Liquid Effluents of the Teck Cominco Metals Ltd. Trail Facility” (156,959 US\$)

August – October 2007: Transpharm Strategies LLC (8,287 US\$)

- **Principle Investigator/Study Coordinator:** “Service to test the effects of letrozole and one proprietary drug on testosterone (T) and estradiol (E2) production using the H295R Steroidogenesis Assay.”

AREAS OF EXPERTISE:

My research and experience is anchored in aquatic ecotoxicology with a specialization in endocrine disrupter research.

- Accumulation techniques (SPMDs) to enrich and to investigate organic pollutants
- Biomarkers of exposure/effect
 - MFO (AROD/ECOD)
 - AChE
 - Induction of vitellogenin
 - Sex steroids
 - Steroidogenic enzymes
 - Secondary sex characteristics
 - Histopathology
- Biochemical techniques (ELISA, RIA, microsomal prep., photometric and fluometric methods, immunohistochemistry, etc.)
- Molecular techniques to identify changes at the gene expression level (RT-PCR, whole mount in situ hybridization)
- Histological techniques and characterization of biological samples (whole mount histology, histopathology of gonads and other tissues, electron microscopically evaluation of gonadal ultrastructures)
- Biological characterization of biota samples (meristic parameters, age determination, etc.)
- Biological and chemical characterization of environmental samples (Sediment, Water, Suspended Matter)
- Application of bioassay techniques (ex-vivo and in-vitro cell culture systems) to identify and evaluate effects of individual pollutants and environmental samples
- Application of RT-PCR and in situ hybridization techniques to identify effects of environmental pollutants at the level of gene expression
- Ecotoxicological risk assessment in aquatic systems
- Aquatic Ecology with a focus on fish and amphibians
- Statistical analyzes (SPSS, SYSTAT, SAS, ECXELL, QuattroPro, etc.)

TEACHING BACKGROUND:

1997-2002 University of Hamburg

Introductory Seminar into Aquatic Ecotoxicology

2002-present Michigan State University

ZOL446, Environmental Issues and Public Policies

ZOL814, Aquatic Toxicology

THESES:

“Application of SPMDs to investigate the contamination of aquatic systems with organic pollutants.” Diploma thesis at the University of Hamburg, Germany. 1997.

“Natural variability of endocrine functions and their modulation by anthropogenic influences.” Ph.D. thesis at the University of Hamburg, Germany. 2001.

PROFESSIONAL ORGANIZATIONS:

Society of Environmental Toxicology and Chemistry (SETAC): since 1999

- Member since 1999
- Session Chairperson, “Biomarkers” 4th World Congress, Portland, Oregon, USA, 2004

Ecotoxicology and Environmental Safety (EESA): since 2004

- Editorial Board Member

Environmental Science and Pollution Research International (ESPR): since 2006

- Subject Editor: Terrestrial Ecology and Biology / Soil and Sediment: Toxicology-related subjects

PRESENTATIONS:

ABSTRACTS READ:

Chinese Academy of Sciences

- (1) “Elucidating Changes in Aromatase (CYP19) Gene Expression in Japanese Medaka (*Oryzias latipes*) Exposed to Fadrozol: *In situ* Hybridization in a Whole Animal Model. With A. Tompsett, J.W. Park, X. Zhang, J.L. Newsted, P.D. Jones, D. Au, P.K.S. Lam, J.P. Giesy and R. S.S. Wu. To: Institute of Oceanography, Chinese Academy of Sciences, and State Key Laboratory of Marine Ecology & Environmental Sciences, Qingdao, PR China, January 9, 2007. *Invited speaker.*

German Federal Environmental Protection Agency

- (1) “Ecotoxicological relevance of endocrine modulation in fish along the river Elbe.” Second Statusseminar: Endocrine Disrupters, 2-4 April 2001 Berlin, Germany. *Platform.*

Institute for Hormone and Fertility Research at the University of Hamburg

- (1) “Effects of Endocrine Disrupting Substances on Laboratory and Wild Fish Populations.” Workshop on “the Importance of Endocrine Disruption for Wild and Domestic Animals and its Relevance for Human Medicine” of the

Graduiertenkolleg 336, April 27 2003 Hamburg, Germany. *Invited speaker.*

Michigan Society of Toxicology & Midwest Teratology Association:

- (1) “Effects of Endocrine Disrupting Substances on Laboratory and Feral Fishes.” Fall meeting of the Michigan Society of Toxicology and the Midwest Teratology Association on “Endocrine Disruption”, November 2002 East Lansing, USA. *Invited Speaker.*

Society of Environmental Toxicology & Chemistry (SETAC):

- (1) “Serum marker in fish provide evidence for endocrine modulation along the Elbe River, Germany.” 9th Annual Meeting of SETAC-Europe, 25-29 May 1999 Leipzig, Germany. *Poster.*
- (2) ”Erhöhte Vitellogenin- und Steroid-Konzentrationen im Blutplasma männlicher Brassen (*Abramis brama* [L.]) aus der Elbe: "Edocrine Disruption" oder natürliche Variabilität?“ 4th Annual Meeting of SETAC-German Language Branch, September 1999 Weihenstephan, Germany. *Poster.*
- (3) “ Natürliche Variabilität reproduktionsbiologischer Funktionen als Grundlage der Beurteilung endokriner Störungen im Brassen (*Abramis brama*[L]) entlang der Elbe.“ 5th Annual Meeting of SETAC-German Language Branch, September 2000 Hamburg-Harburg, Germany. *Poster.*
- (4) “Disruption of Steroid Synthesis: An Environmentally Relevant Mechanism of Endocrine Modulation.” 23rd Annual Meeting of SETAC-North America, 16-20 November 2002 Salt Lake City, USA. *Platform.*
- (5) “Effects of atrazine on developing *Xenopus laevis*: Potential endocrine disruption.” 23rd Annual Meeting of SETAC-North America, 16-20 November 2002 Salt Lake City, USA. *Poster.*
- (6) “Effects of atrazine on developing *Rana clamitans*.” 23rd Annual Meeting of SETAC-North America, 16-20 November 2002 Salt Lake City, USA. *Poster.*
- (7) “Aromatase activity in tissues from adult *Xenopus laevis* exposed to atrazine.” 23rd Annual Meeting of SETAC-North America, 16-20 November 2002 Salt Lake City, USA. *Poster.*
- (8) “Plasma sex steroids concentrations in *Xenopus laevis* exposed to atrazine in the field in South Africa.” 13th Annual Meeting of SETAC-Europe, 27 April – 1 May 2003 Hamburg, Germany. *Platform.*
- (9) “Endocrine Modulation along the Elbe River: complex low-level exposure situations, population diversity, variability of phenomena.” 13th Annual

Meeting of SETAC-Europe, 27 April – 1 May 2003 Hamburg, Germany.
Platform.

- (10) “Effects of Atrazine on adult *Xenopus laevis* in the Wild and the Laboratory: No Evidence for an Aromatase based Mechanism.” 24th Annual Meeting of SETAC-North America, 7-13 November 2003 Austin, USA. **Invited speaker.**
- (11) “Effects of estradiol and atrazine on testicular ultrastructure in *Xenopus laevis*.” 4th SETAC World Congress and 25th Annual Meeting of SETAC-North America, 14-18 November 2004 Portland, USA. *Platform.*
- (12) “Effect profiles of TCDD, and selected PCBs exposure on MFO induction in primary hepatocytes of brown house snakes (*Lamprophis fuliginosus*).” 4th SETAC World Congress and 25th Annual Meeting of SETAC-North America, 14-18 November 2004 Portland, USA. *Poster.*
- (13) “Effects of atrazine on mixed function oxigenases in *Xenopus laevis*.” 4th SETAC World Congress and 25th Annual Meeting of SETAC-North America, 14-18 November 2004 Portland, USA. *Poster.*
- (14) “Seasonal changes and natural variability of plasma sex steroid concentrations in *Xenopus laevis* from the wild, South Africa.” 4th SETAC World Congress and 25th Annual Meeting of SETAC-North America, 14-18 November 2004 Portland, USA. *Poster.*
- (15) “Effects of atrazine and estradiol on plasma sex steroid concentrations in male adult *Xenopus laevis*.” 4th SETAC World Congress and 25th Annual Meeting of SETAC-North America, 14-18 November 2004 Portland, USA. *Poster.*
- (16) “Development of a H295R Cell Line Screening Test to Evaluate Toxicant-Induced Effects on Steroidogenesis.” 15th Annual Meeting of SETAC-Europe, 22 – 26 May 2005 Lille, France. *Platform.*
- (17) “Parasitism in fish – an endocrine modulator of ecological relevance?” 26th Annual Meeting of SETAC North America, 13-17 November 2005, Baltimore, MD, USA. *Platform.*
- (18) “Inter-laboratory pre-validation of the H295R Cell Line Steroidogenesis Assay” 16th Annual Meeting of SETAC-Europe, 7 – 11 May 2006 The Hague, The Netherlands. *Platform.*
- (19) “Veränderungen der Genexpression und der Synthese von Steroidhormonen in H295R-Zellen nach Belastung mit Donausedimenten“ With: S. Grund; T. Garcia, E. Higley, J. Giesy, S. Keiter, Th. Braunbeck, M. Hecker & H. Hollert. 11th Annual Meeting of SETAC German Language Branch, 3 -5 September 2006, Landau, Germany. *Platform. Best Student Paper.*
- (20) “Methodology employing belted kingfisher (*Ceryle alcyon*) as a receptor in an ecological risk assessment of the Tittabawassee River, MI, USA.” With: R.M.

Seston, M.J. Zwiernik, D.L. Tazelaar, J.N. Moore, T.B. Fredricks, S.J. Coefield, and J.P. Giesy. 27th Annual Meeting of SETAC North America, 4-9 November, 2006, Montreal, Quebec. *Poster*.

- (21) “Kinetics of Two Polychlorinated Dibenzofurans (PCDFs) in Mink (*Mustela vison*): A Laboratory Feeding Study” With: J.N. Moore, M.J. Zwiernik, S. J. Bursian, K.J. Beckett, D.W. Hamman, P.W. Bradley, B. Yamini, S.D. Fitzgerald, D. P. Kay, M.S. Shotwell, J.L. Newsted, L.L. Aylward, J. P. Giesy. 27th Annual Meeting of SETAC North American, Montreal, Quebec, 5-9 November, 2006. *Poster*.
- (22) “Human Adrenocarcinoma (H295R) Cells for Rapid In vitro Determination of Effects on Steroidogenesis: Sex Steroid Concentrations and Aromatase Activity.” With: E. B. Higley, J.L. Newsted, M.B. Murphy, P.D. Jones, R. Wu, J.P. Giesy. 27th Annual Meeting of SETAC North America, 4-9 November, 2006, Montreal, Quebec. *Poster*.
- (23) “mRNA gene expressions of CYP19a and b in juvenile Japanese medaka (*Oryzias latipes*) exposed to fadrozole: comparison of RT-PCR with ISH methods.” With: J.W. Park, A.R. Tompsett, P.D. Jones, J.L. Newsted, J.P. Giesy. 27th Annual Meeting of SETAC North America, 4-9 November, 2006, Montreal, Quebec. *Poster*.
- (24) “Development and Validation of a Quantitative Real Time RT-PCR System to Study Chemical Induced Effects on the HPG-axis of Medaka (*Oryzias latipes*).” With: X. Zhang, J.-W. Park, A.R. Tompsett, P.D. Jones, J. Newsted, J.P. Giesy. 27th Annual Meeting of SETAC North America, 4-9 November, 2006, Montreal, Quebec. *Poster*.
- (25) “Comparison of the fathead minnow ovarian steroidogenesis assay and the H295R cell-based steroidogenesis assay to identify endocrine active chemicals.” 27th Annual Meeting of SETAC North America, 4-9 November, 2006, Montreal, Quebec. *Interactive Platform*.

OECD/EDMVAC

- (1) “Development and Pre-Validation of a H295R Cell Line Screening Test to Evaluate Toxicant-Induced Effects on Steroidogenesis” Second Plenary Meeting of the Endocrine Disruptor Methods Advisory Committee, November 30 – December 2, 2005, Raleigh, NC, USA. *Invited Speaker*.
- (2) “Development and Pre-Validation of a H295R Cell Line Screening Test to Evaluate Toxicant-Induced Effects on Steroidogenesis” OECD VMG NA Meeting, 14 - 15 December 2005, Paris, France. *Invited Speaker*.
- (3) “Refinement & Pre-Validation of a H295R Cell Line Screening Test to Evaluate Toxicant-Induced Effects on Steroidogenesis” OECD VMG NA Meeting, 12-14 December, 2006, Tokyo, Japan. *Invited Speaker*.

Technische Universität Hamburg-Harburg (TUHH)

- (1) "Endokrin wirksame Verbindungen im Abwasser und ihre Wirkungen im aquatischen Bereich." 13. Kolloquium und Fortbildungskurs zur Abwasserwirtschaft; 11-13 September 2001 Hamburg, Germany. *Invited Speaker.*

PROCEEDINGS:

- (1) **Hecker, M.** 2001. Natural variability of endocrine functions and their modulation by anthropogenic influences. Ph.D. thesis at the University of Hamburg, Germany. In: Reports of the ZMK, Series E, 16: 149p.
- (2) **Hecker, M.** 2001. Endokrin wirksame Verbindungen im Abwasser und ihre Wirkungen im aquatischen Bereich. In: Otterpohl, R. und Gulyas, H. (eds.), 13. Kolloquium und Fortbildungskurs zur Abwasserwirtschaft; Hamburger Berichte zur Siedlungswasserwirtschaft, 32: 162.
- (3) **Hecker, M;** Beck, M.-P.; Hoffmann, M. and Karbe, L. 2001. Ecotoxicological Relevance of Endocrine Modulation in Fish along the River Elbe. In: Richter, A. and Olazabal U. (eds); Proceedings from the Second Statusseminar Endocrine Disrupters; Berlin, Germany: 79-83.

REPORTS:

- (1) Karbe L., J. Westendorf, M.-P. Beck, B. Gutendorf & **M. Hecker.** 2000. Verbundprogramm: Chemikalien in der Umwelt mit Wirkung auf das endokrine System (Umwelthormone) Teilprojekt: Ökotoxikologische Relevanz endokrin wirksamer Stoffe in der aquatischen Umwelt - Untersuchungen am Modell Elbe. Umweltforschungsplan des BmU. Forschungsbericht 297 65 ½
- (2) Villeneuve, D.L., Coady, K., **Hecker, M.**, Murphy, M.B., Jones, P.D. and Giesy, J.P. 2003. Methods Development for the Study of Mechanism of Action of Atrazine in Adult and Metamorphosing *Xenopus laevis* and *Rana clamitans*: Aromatase Induction. Ecorisk, Inc., MSU-07, submitted to Syngenta Crop Protection, Inc., Dated February 17, 2003, 111 pp.
- (3) Jones, P.D., Murphy, M.B., **Hecker, M.**, Giesy, J.P. 2003. Tissue Pesticide Residues And Histology Of The Larynx And Gonads In Native Green Frogs (*Rana Clamitans*) Collected From Agricultural Areas In Michigan: Hormone Analysis. Ecorisk, Inc., MSU-07, submitted to Syngenta Crop Protection, Inc., Dated February 13, 2003, 64 pp.
- (4) **Hecker, M.**, Coady, K.K., Villeneuve, D.L., Murphy, M.B., Jones, P.D., Giesy, J.P. 2003. A pilot study of response of larval *Rana clamitans* to atrazine exposure: Assessment of metamorphosis and gonadal and laryngeal morphology and selected hormones and enzyme activities. Ecorisk, Inc.,

MSU-03, submitted to Syngenta Crop Protection, Inc., Dated February 13, 2003, 79 pp.

- (5) **Hecker, M.**, Coady, K.K., Villeneuve, D.L., Murphy, M.B., Jones, P.D., Giesy, J.P. 2003. Response of *Xenopus laevis* to atrazine exposure: assessment of the Mechanism of action of atrazine. Ecorisk, Inc., MSU-03, submitted to Syngenta Crop Protection, Inc., Dated February 13, 2003, 143 pp.
- (6) Giesy, J.P., **Hecker, M.**, Jones, P.D. 2003. South African Analytical Support – Hormone and Aromatase Analysis (SA-01C). Ecorisk, Inc., MSU-07, submitted to Syngenta Crop Protection, Inc., Dated February 12, 2003, 138 pp.
- (7) Giesy, J.P., **Hecker, M.**, Jones, P.D., Murphy, M.B., Newsted, J.L., Mehrle, P. 2004. Development of an Assay Using the H295R Cell Line to Identify Chemical Modulators of Steroidogenesis and Aromatase Activity. Progress report. ENTRIX, Inc., submitted to US-EPA, Dated October 2004, 243pp.
- (8) **Hecker, M.**, Giesy, J.P., Jones, P.D., Higley, E.B., Newsted, J.L., Mehrle, P. 2006. Inter-Laboratory Comparison and Validation of the H295R Cell System to Test for Effects of Chemicals on Steroid Hormone Synthesis. Final draft report. ENTRIX, Inc., submitted to US-EPA, Dated February 2004, 364pp.
- (9) **Hecker, M.**, Giesy, J.P., Jones, P.D., Higley, E.B., Newsted, J.L., Mehrle, P. 2006. Influence of cell passage and freeze/thaw events on basal production of 17 β -estradiol and testosterone by H295R cells. Interim draft report. ENTRIX, Inc., submitted to US-EPA, Dated September 2006.

BOOK CHAPTERS:

- (1) Karbe L., Ternes T., Wenzel A., and **Hecker M.** 2005. Oestrogens and xenoestrogens in German surface waters and their effects on fish. In: Estrogens and xenoestrogens in the aquatic environment. Vethaak D., ed. SETAC Press, Pensacola, FL, USA. p 365-402.

BOOK REVIEWS:

- (1) Giesy J.P. and **Hecker M.** 2003. Review of M. Adams (Ed.). Biological indicators of aquatic ecosystem health. *The Quarterly Review of Biology*, 79(2):219-220.

SHORT FEATURES & EDITORIALS:

- (1) **Hecker, M.** 2006. Learning Discourse: Parasitism in Fish – An Ecologically Relevant Endocrine Modulator? *SETAC Globe*, 7(3):30-31.
- (2) Hollert, H., **Hecker, M.** and Xu, Z. 2006. The New ESPR Subject Area Framework - Area 1: Terrestrial Ecology and Biology / Soil and Sediment: Toxicology-related subjects. *Environ. Sci. Pollut. Res.* 13, 287–292.
- (3) Hollert, H., **Hecker, M.**, Steinberg, C.E.W., Young, A.L. 2007. ESPR's total environment. *Environ. Sci. Pollut. Res.* 14(special issue 1): 1-2.

PEER REVIEWED PUBLICATIONS:

- (1) Hühnerfuss H., Gatermann R., Biselli S., Rimkus G.G., **Hecker M.**, Kallenborn R. and Karbe, L. (1999). Enantioselective transformation of polycyclic musks in aquatic biota, *Organohalogen Compounds* 40: 401-404.
- (2) Gatermann, R., Hühnerfuss, H., Biselli, S., Rimkus, G.G., **Hecker, M.**, Kallenborn, R. and Karbe, L. (1999). Species-dependent enantioselective transformation of HHCB, AHTN and ATII in crucian carp (*Carassius carassius*) and tench (*Tinca tinca*), *Organohalogen Compounds* 40: 595-598.
- (3) **Hecker, M.**; Tyler, C.R; Maddix, S. and Karbe, L. (2002). Plasma biomarkers in fish provide evidence for endocrine modulation in the Elbe River, Germany. *Environ. Sci. Technol.* 36: 2311-2321.
- (4) Gatermann, R., Biselli, S., Hühnerfuss, H., Rimkus, G. G., **Hecker, M.** and Karbe, L. (2002): Synthetic Musks in the Environment. Part 1: Species-Dependent Bioaccumulation of Polycyclic and Nitro Musk Fragrances in Freshwater Fish and Mussels, *Arch. Environ. Contam. Toxicol.*, 42, 437-446.
- (5) Gatermann, R., Biselli, S., Hühnerfuss, H., Rimkus, G. G., Franke, S., **Hecker, M.**, Kallenborn, R., Karbe, L. and W. A. König (2002): Synthetic Musks in the Environment. Part 2: Enantioselective Transformation of the Polycyclic Musk Fragrances HHCB, AHTN, AHDI, and ATII in Freshwater Fish, *Arch. Environ. Contam. Toxicol.*, 42, 447-453.
- (6) **Hecker, M.**, Giesy, J.P., Jones, P.D., Jooste, A.M., Carr, J.A., Solomon, K.R., Smith, E.E., Van Der Kraak, G, Kendall, R.J. and du Preez, L. 2004. Plasma Sex Steroid Concentrations and Gonadal Aromatase Activities in African Clawed frogs (*Xenopus laevis*) From the Corn-Growing Region of South Africa. *Environ. Toxicol. Chem.* 23: 1996-2007.
- (7) Coady, K. K., Murphy, M. B., Villeneuve, D. L., **Hecker, M.**, Carr, J. A., Solomon, K. R., Smith, E. E., Van Der Kraak, G., Kendall, R. J., & Giesy, J. P. 2004. Effects of atrazine on metamorphosis, growth, and gonadal development in the green frog (*Rana Clamitans*). *J. Toxicol. Environ. Health.* 67: 941-957.
- (8) Coady, K. K., Murphy, M. B., Villeneuve, D. L., **Hecker, M.**, Carr, J. A., Solomon, K. R., Smith, E. E., Van Der Kraak, G., Kendall, R. J., & Giesy, J. P. 2005. Effects of atrazine on metamorphosis, growth, and gonadal and laryngeal development in *Xenopus laevis*. *Exotoxicol. Environ. Saf.* 62 (2): 160-173.
- (9) **Hecker, M.** and Karbe, L. 2005. Parasitism in fish - an endocrine modulator of relevance? *Aquat. Toxicol.* 72: 195-207.
- (10) **Hecker, M.**, Kim, W.J., Park, J.-W., Murphy, M. B., Villeneuve, D.L., Coady, K.K., Jones, P.D., Solomon, K.R., Van Der Kraak, G., Carr, J.A., Smith, E.E., du Preez, L., Kendall, R.J. and Giesy, J. P. 2005. Sub-cellular Effects of

Atrazine and Estradiol on the Testis of African Clawed Frogs (*Xenopus laevis*). *Aquat. Toxicol.* 72(4): 383-396.

- (11) Zhang, X, Yu, R, Jones, P.D., Newsted, J.L., Gracia, T., **Hecker, M.**, Hilscherova, K., Sanderson, J.T., Wu, R., and Giesy, J.P. 2005. Quantitative RT-PCR Methods for Evaluating Toxicant-Induced Effects on Steroidogenesis Using the H295R Cell Line. *Environ. Sci. Technol.* 39: 2777-2785.
- (12) **Hecker, M.**, Park, J.-W., Murphy, M. B., Jones, P.D., Thompset, A., Solomon, K.R., Van Der Kraak, G., Carr, J.A., Smith, E.E., du Preez, L., Kendall, R.J. and Giesy, J.P. 2005. Effects of atrazine on CYP19 gene expression and aromatase activity in testes and sex steroid concentrations in plasma of male African clawed frogs (*Xenopus laevis*). *Tox. Sci.* 86(2): 273-280.
- (13) **Hecker, M.**, Murphy, M. B., Giesy, J. P. and Hopkins, W. A. 2005. Induction of Cytochrome P4501A in primary hepatocyte cultures of the African brown house snake (*Lamprophis fuliginosus*): An approach to model sensitivity of reptiles to TCDD and selected PCBs. *Environ. Tox. Chem.* 25: 496-502.
- (14) Murphy, M.B., **Hecker, M.**, Coady, K.K., Tompsett, A.R., Jones, P.D., DuPreez, L.H., Everson, G.J., Solomon, K.R., Carr, J.A., Smith, E.E., Kendall, R.J., van der Kraak, G. and Giesy, J.P. 2005. Atrazine concentrations, gonadal gross morphology and histology in ranid frogs collected in Michigan agricultural areas. *Aquat. Toxicol.* 76: 230-245.
- (15) Park, J.-W., **Hecker, M.**, Murphy, M.B. Jones, P.D., Thompset, A., Solomon, K.R., Van Der Kraak, G., Carr, J.A., Smith, E.E., du Preez, L., Kendall, R.J. and Giesy, J.P. Development and optimization of a Q RT-PCR method to quantify *CYP19* mRNA gene expression in testis of male adult *Xenopus laevis*: comparisons with aromatase enzyme activity. *Comp. Physiol. Biochem. B*, 144: 18-28.
- (16) Murphy, M.B., **Hecker, M.**, Coady, K.K., Tompsett, A.R., Jones, P.D., DuPreez, L.H., Solomon, K.R., Carr, J.A., Smith, E.E., Kendall, R.J., van der Kraak, G. and Giesy, J.P. 2006. Plasma steroid hormone concentrations, aromatase activities and GSI in ranid frogs collected from agricultural and non-agricultural sites in Michigan. *Aquat. Toxicol.* 77: 153-166.
- (17) Murphy, M.B., **Hecker, M.**, Coady, K.K., Tompsett, A.R., Jones, P.D., DuPreez, L.H., Solomon, K.R., Carr, J.A., Smith, E.E., Kendall, R.J., van der Kraak, G. and Giesy, J.P. 2006. Sediment TCDD-EQ's and EROD and MROD activities in ranid frogs from agricultural and non-agricultural sites in Michigan. *Arch. Environ. Contam. Toxicol.* 51(3): 467-477.
- (18) **Hecker, M.**, Murphy MB, Coady KK, Villeneuve DL, Jones PD, Carr JA, Solomon KR, Smith EE, Van Der Kraak GJ, Gross T, du Preez LH, Kendall RJ & Giesy JP. 2006. Terminology Used to Describe Abnormalities Observed in the Gonads of Fish and Frogs. *Rev. Environ. Contam. Toxicol.*, 187: 102-131.

- (19) Blaha, L., Hilscherova, K., Mazurova, E., **Hecker, M.**, Jones, P.D., Bradley, P., Gracia, T.R., Duris, Z., Holoubek, I. and Giesy J.P. Alteration of steroidogenesis in H295R cells by organic sediment contaminants and relationships to other endocrine disrupting effects. *Environment International*. 32: 749-759.
- (20) Gracia, T., Hilscherova, K., Jones, P.D., Newsted, J.L., Zhang, X., **Hecker, M.**, Higley, E.B., Sanderson, J. T., Yu, R.M.K., Wu, R.S.S. and Giesy, J.P. 2005. Effects of Chemical Mixtures on the Expression of Ten Steroidogenic Genes in the H295R Cell Line. *Ecotox. Environ. Saf.*, 65: 293-305.
- (21) **Hecker, M.**; Sanderson, T and Karbe, L. Suppression of CYP19 aromatase activity in wild bream from the river Elbe, Germany: an environmentally relevant mechanism of endocrine disruption. *Chemosphere* 66: 542-552.
- (22) **Hecker, M.**, Newsted, J.L., Murphy, M.B., Higley, E.B., Jones, P.D., Wu, R., and Giesy, J.P. 2006. Human adrenocarcinoma (H295R) cells for rapid in vitro determination of effects on steroidogenesis: hormone production. *Toxicol. Appl. Pharm.* 217: 114-124.
- (23) **Hecker, M.**, Hollert, H., Cooper, R., Vinggaard, A.-M., Akahori, Y., Murphy, M., Nellesmann, C., Higley, E., Newsted, J., Wu, R., Lam, P., Laskey, J., Buckalew, A., Grund, S., Nakai, M., Timm, G., Giesy, J. 2007. The OECD Validation Program of the H295R Steroidogenesis Assay for the Identification of In Vitro Inhibitors and Inducers of Testosterone and Estradiol Production. Phase 2: Inter-Laboratory Pre-Validation Studies. *Env. Sci. Pollut. Res.* 14 (Special Issue 1): 23–30.
- (25) Villeneuve, D.L., Ankley, G.T., Makynen, E.A., Blake, L.S., Greene, K.J., Higley, E.B., Giesy, J.P., **Hecker, M.** 2007. Comparison of a fathead minnow ovarian steroidogenesis assay and an H295R cell-based steroidogenesis assay for identifying endocrine active chemicals. *Ecotox. Environ. Saf.* 68: 20-32.
- (26) **Hecker, M.** 2006. Parasitismus und „Endokrine Disruption“ in Fischen – Die Notwendigkeit holistischer Ansätze in der Umwelttoxikologie. *Umweltwissenschaften and Schadstoff-Forschung.* 18: 248-253.
- (27) He, Y., Murphy, M.B., Yu, R.M.K., Lam, M.H.W., **Hecker, M.**, Giesy, J.P., Wu, R.S.S., Lam, P.K.S. 2007. Effects of twenty PBDE metabolites on steroidogenesis in the H295R cell line. *Toxicol. Sci.*, accepted for publication.
- (28) Gracia, T., Hilscherova, K., Jones, P.D., Newsted, J.L., Higley, E.B., Zhang, X., **Hecker, M.**, Murphy, M.B., Yu, R.M.K., Lam, P.K.S., Wu, R.S.S., Giesy, J.P. Modulation of steroidogenic gene expression and hormone production of H295R cells by pharmaceuticals and other environmentally active compounds. *Toxicol. Appl. Pharm.*, accepted for publication.
- (29) Zhang, X, Yu, R, Jones, P.D., Newsted, J.L., **Hecker, M.**, Gracia, T., Hilscherova, K., Yu, R., Wu, R., and Giesy, J.P. Comparison of Human

H295R, JEG-3 and Rat R2C Cell lines for Determining Effects on Steroidogenesis. Submitted to *Toxicol. Appl. Pharmacol.*

- (30) Gracia, T., Jones, P.D., Higley, E.B., Hilscherova, K., Newsted, J.L., Murphy, M.B., Chan, K.Y., Zhang, X., **Hecker, M.**, Lam, P.K.S., Wu, R.S.S., Giesy, J.P. 2007. An in vitro study on endocrine disrupting activities in coastal water and sewage effluents of Hong Kong. Submitted to *Marine Pollution*.
- (31) Brack, W., Blaha, L., Giesy, J.P., Grote, M., Möder, M., Schrader, S., **Hecker, M.** 2007. Polychlorinated naphthalenes and other dioxin-like acting compounds in Elbe River sediments. Submitted to *Environ. Toxicol. Chem.*
- (32) **Hecker, M.**, Giesy, J.P. 2008. Novel trends in endocrine disruptor testing: the H295R Steroidogenesis Assay to identify inducers and inhibitors of hormone production. Invited by *Anal. Biochem. Chem.*

PUBLICATIONS IN PREPARATION:

- (1) Zhang, X., **Hecker, M.**, Newsted, J.L., Park, J.-W., Tompsett, A.R., Jones, P.D., Giesy, J.P. Molecular cloning and analysis of brain expression of neuropeptide Y, GTH α and LH β in the medaka, *Oryzias latipes*. In prep.
- (2) Zhang, X., Moore, J.N., Zwiernik, M.J., **Hecker, M.**, Jones, P.D., Newsted, J.L., Bursian, S.J., Giesy, J.P. Sequencing and characterization of mixed function monooxygenase genes CYP1A1 and CYP1A2 of Mink (*Mustela vison*). In prep.
- (3) Moore, J., **Hecker, M.**, Zwiernik, M., Bursian, S.J., Newsted, J.L., Budinsky, R., Higley, E.B., Alward, L., Fitzgerald, S.D., Giesy, J.P. Relationships between P450 Enzyme Induction, Jaw Histology and Tissue Morphology in mink (*Mustela vison*) Exposed to Polychlorinated Dibenzofurans (PCDFs). In prep.
- (4) Zhang, X., **Hecker, M.**, Higley, E.B., Jones, P.D., Newsted, J.L., Giesy, J.P. Classification of Chemicals Based on Concentration Dependent Hormone Production in H295R Cells Using “ToxClust” Program. In prep.
- (5) **Hecker, M.**, Higley, E.B., Newsted, J.L., Jones, P.D., Wu, R., and Giesy, J.P. Human adrenocarcinoma (H295R) cells for rapid in vitro determination of effects on steroidogenesis: comparison of aromatase activity and sex steroid production. In prep.
- (6) **Hecker, M.**; Sanderson, T., Hoffmann, M. and Karbe, L. Natural variability of reproductive functions in wild fish populations from the River Elbe, Germany. In prep.

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