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**Major Professor:** Dr. Terence Barry

**Degree Objective:** Ph.D. Endocrinology and Reproductive Physiology

**Background:** BS Biology, Winona State University; MS Biology, Loyola University Chicago

**Current Research Project:**

Chemoreception involves a chemical cue released into the environment by an organism that can elicit a behavioral and/or physiological response in another organism. In fish, an “alarm chemical” is released during predation that alerts conspecifics of a potential threat. The chemical mixture released from predation, i.e., skin-wound and excrement contain molecules with the potential to activate olfactory receptors in other fish. These odor-activated chemoreceptors can signal endocrine responses to enhance survival. My research has demonstrated that a chemical cue associated with walleye (*Sander vitreus*) predation on yellow perch (*Perca flavescens*) significantly increases the growth-rate of exposed yellow perch. However, the source, chemical nature, and mechanism of action of this putative growth-promoting pheromone (pGPP) are all unknown. The goals of this project are to (1) elucidate the source and chemical nature of the growth-promoting signal, and (2) determine the endocrine and transcriptomic mechanisms of olfactory mediated accelerated somatic growth. I hypothesize that the pGPP is associated with repeated exposure to alarm-substances and excretion cues that stimulate growth hormones produced by the hypothalamic-pituitary-somatotropic axis, specifically insulin-like growth factor (IGF-1) in predation exposed fish compared to predation naïve fish. My research has shown that yellow perch exposed to predation chemical cues have increased circulating, unbound IGF-1b after eight weeks of exposure. I’m currently looking for transcriptomic markers from olfactory tissues, pituitary glands, liver and muscle tissue in pGPP exposed yellow perch to find biomarkers of the pGPP induced accelerated muscle growth. The goal is to find what olfactory receptors activate the growth-promoting signals and what muscle transcription factors facilitate accelerated growth. Determining the mechanisms of accelerated somatic growth could be beneficial for the aquaculture of this highly valued fish species.



## **Publications:**

Hoppe, P. D., W. Li, L. Penn, D. Schomburg, T.P. Barry, D. Shanmuganayagam (2019). Tissue specific optimal reference genes for robust real-time PCR normalization in yellow perch *Perca flavescens* somatic growth axis. *In review: BMC Molecular and Cell Biology*

Sanderson, B. L. and P. D. Hoppe. (2019). Dietary shifts from maternal marine derived nutrients to natal stream food resources in juvenile Chinook salmon in the Salmon River Basin. *In preparation for: Canadian Journal of Fisheries and Aquatic Sciences.*

Barry, T.B., G.K. Dehnert, P.D. Hoppe and P.W. Sorenson. (2017). Chemicals released by predation increase the growth rate of yellow perch, *Perca flavescens*. *Journal of Fish Biology*, 91(6).

Hoppe, P. D., E. J. Rosi, H. Bechtold. (2012). The antihistamine cimetidine alters invertebrate growth and population dynamics in artificial streams. *Freshwater Science*, 31(2).

## **International Presentations:**

Invited Speaker: Hoppe, P. D., Dehnert, G. K., Sorensen, P. W., Barry, T. P. (2019). Chemicals Released by Predation Increase the Growth Rate of Yellow Perch, *Perca flavescens*. *Triennial World Aquaculture Society Meeting*. New Orleans, LA. Abstract 225.

Invited Speaker (Chemoreception session): Hoppe, P. D., Dehnert, G. K., Sorensen, P. W., Barry, T. P. (2018). Chemicals Released by Predation Increase the Growth Rate of Yellow Perch, *Perca flavescens*. *13th International Congress on the Biology of Fish*. Calgary, Canada.

## **Other Presentations:**

Guest Speaker: Hoppe, P.D. (2019). Growth Promoting Pheromones. Stand Up Science National Tour with comedian Shane Mauss, Madison, WI. Dec. 3rd, 2019.

Oral Presentation: Hoppe, P. D., Dehnert, G. K., Sorensen, P. W., Barry, T. P. (2019). Hoppe, P. D., Barry, T. P. (2019). Chemicals Released by Predation Increase the Growth Rate of Yellow Perch, *Perca flavescens*. Endocrinology-Reproductive Physiology Training Program Annual Scientific Symposium, April 18th, 2019.

Selected for Oral Presentation: Hoppe, P. D., Dehnert, G. K., Sorensen, P. W., Barry, T. P. (2019). Predation Cues Increase the Growth Rate of Yellow Perch. Wisconsin Lakes Convention, April 11th, 2019.



## **Teaching and Mentorship:**

Mentor for UW-Madison undergraduate students: Adeline Zimmer, Declan McCormick, Shea Tilloston, Karis Brandhagen, Lauren Penn, Xuanqi Xu, Tianhua Gao, Nate Coulthurst and Justin Hickman.