

Nicholas J. Gidmark

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Research Interests

Biomechanics, muscle physiology, functional morphology, and evolution of vertebrates.
Current projects examine the anatomy and musculo-skeletal mechanics of pharyngeal food processing in common carp, black carp and grass carp.

Education

2006-present: PhD, Brown University, Dept. of Ecology and Evolutionary Biology, Brainerd Lab of Biomechanics and Functional Morphology.
Thesis title: *Form, Function and Limitation in the cypriniform Pharyngeal Jaw.*
Defense date: April 12, 2012.

2002-2006: B.S., University of Minnesota, College of Natural Resources, Dept. of Fisheries, Wildlife, and Conservation biology. *Magna cum laude* with Highest Distinction, GPA: 3.84. Honors thesis (advisor: Dr. Andrew Simons) title: *Character Suites Suggest Frequent, Punctuated Evolution of Herbivorous Morphologies in Minnows (Actinopterygii: Cyprinidae).*

Awards and Grants

2010	Stability and performance in the Cypriniform pharyngeal jaw. ASIH Raney grant.	\$1000
2010	Muscle performance in the Cypriniform pharyngeal jaw. Sigma Xi Grant-In-Aid of Research.	\$720
2005	Comparative Evolution of Trophic Morphology in North American Minnows (Teleostei: Cyprinidae). Sigma Xi Grant-In-Aid of Research.	\$220
2005	Ludden Scholarship, for professional commitment & academic achievement. College of Natural Resources, University of Minnesota.	\$1500
2004	American Fisheries Society undergraduate scholarship, 1 st place winner.	\$500

Research Skills, Techniques and Expertise

Experimental: Animal surgery; videography (standard and x-ray); sono- and radio-micrometry; electromyography; strain gauge analysis; materials testing, muscle stimulation.

Morphological: Laser scanning; CT manipulation; digital model editing (Geo Magic, Microscan Tools, Maya); SEM imaging; double staining & clearing; macro and micro dissection; histology using low viscosity nitrocellulose.

Molecular: DNA extraction, PCR amplification, DNA sequencing.

Analytical: XROMM (X-ray Reconstruction Of Moving Morphology); Matlab programming; R; Scientific animation in Maya; JMP; Image J; phylogenetic treatment of molecular & morphological data.

Visual: Video production, processing and editing using Combustion, Maya, Cleaner, Adobe After Effects and Virtual Dub; Adobe Illustrator.

Other: Machining and construction with acrylic and metal; Aquarium construction with acrylic sheet; collection and identification of North American freshwater fishes; husbandry and pathology of fishes (freshwater and marine); radio telemetry; mist netting; orienteering.

Peer-Reviewed Publications

Mercado-Silva, N, **NJ Gidmark**, AM Simons and CP Ornelas-Garcia. Accepted. Characidae: Tetras & Characins. *In*: BM Burr and M Warren (eds). North American Freshwater Fishes, Volume II. The Johns Hopkins University Press.

Laulicht, B, **NJ Gidmark**, A Tripathi and E Mathiowitz. 2011. Localized drug delivery from magnetic pills. *PNAS* 108(6): 2252-2257.

Gidmark, NJ, JA Strother, JM Horton, AP Summers and EL Brainerd. 2011. Locomotory transition from water to sand and its effects on undulatory kinematics in sand lances (Ammodytidae). *JEB* 214: 657-664.

Gidmark, NJ and AM Simons. In press. Cyprinidae: Minnows, Shiners & Carps. *In*: BM Burr and M Warren (eds). North American Freshwater Fishes, Volume I. The Johns Hopkins University Press.

Simons, AM and **NJ Gidmark**. 2010. Systematics and Phylogenetic Relationships of Cypriniformes. *In*: Grande, T. (ed). Gonorynchiformes and of Ostariophysan Relationships A Comprehensive Review. Science Publishers Press.

Teaching Experience (Teaching Assistant, unless otherwise noted by asterisk)

XROMM methods short course, Brown University. 2009 and 2010.

Anatomy and Function of Marine Vertebrates, Shoals Marine Lab, Appledore Island. Cornell University. Co-taught with WE Bemis and FE Fish. 2009, 2010.

* Faculty in 2010.

Human Anatomy, Alpert Medical School, Brown University. 2009, 2008.

Sharks: the biology, evolution, and conservation of sharks and their allies. Shoals Marine Lab, Appledore Island. Cornell University.

Human Histology, Alpert Medical School of Brown University. 2008.

Comparative Biology of the Vertebrates, Brown University. 2007 and 2008.

*Laboratory director in 2008.

Biological design: Structural Architecture of Organisms, Brown University. 2007.

The Body: Introduction to Human Anatomy (pre-undergraduate), Brown University 2007.

Ecological Evaluation of Environmental Problems, Univ. of Minnesota. 2006 and 2007.

* Helped to design laboratory material in addition to teaching assistant duties.

Principals of Biology, University of Minnesota. 2004 and 2005.

Conference Presentations (30)

Gidmark, NJ N Konow, M Rainbow and EL Brainerd. 2011. Bite force varies with pharyngeal jaw orientation and adductor muscle length in common carp: XROMM and 3D modeling approaches. Society for Integrative and Comparative Biology meetings, Salt Lake City, Utah, USA

LoPresti, EF, **NJ Gidmark**, and EL Brainerd. 2011. Adaptations for high dexterity and extreme bite force in the pharyngeal jaw of Black Carp. Society for Integrative and Comparative Biology meetings, Salt Lake City, Utah, USA (poster)

Tarrant, JC, **NJ Gidmark**, and EL Brainerd. 2011. XROMM analysis of pharyngeal jaw function in grass carp, *Ctenopharyngodon idella*. Society for Integrative and Comparative Biology meetings, Salt Lake City, Utah, USA (poster)

Gidmark, NJ., KL Staab, EL Brainerd, and LP Hernandez. 2010. 3D maxillary movements effecting kinethmoid rotation and premaxillary protrusion in common carp, *Cyprinus carpio*. International Congress of Vertebrate Morphology, Punta Del Este, Uruguay.

Gidmark, NJ. 2010. Bite force in the Cypriniform pharyngeal jaw. International Congress of Vertebrate Morphology, Punta Del Este, Uruguay.

Gidmark, NJ, KL Staab, LP Hernandez and EL Brainerd. 2010. 3D maxillary movements effecting kinethmoid rotation and premaxillary protrusion in common carp, *Cyprinus carpio*. American Society of Ichthyology and Herpetology, Providence, RI, USA.

Taylor, C., **NJ Gidmark** and EL Brainerd. 2010. Anatomy and histology of a durophagous Cyprinid, the black carp (*Mylopharyngodon piceus*). American Society of Ichthyology and Herpetology annual meeting, Providence, RI, USA. (poster)

Gidmark, NJ. 2010. On the histology of the Cyprinidae. Brown University Seminar Series, Providence, RI, USA.

Gidmark, NJ. 2009. Pharyngeal jaw mechanics in the molluscivorous black carp (Cyprinidae). Division of Vertebrate Morphology (SICB) regional meeting, Providence, RI, USA.

Gidmark, NJ. 2009. On the mechanical significance of a derived snout morphology: new bones to pick in fish skulls. Brown University Seminar Series, Providence RI.

Gidmark, NJ, KL Staab, LP Hernandez and EL Brainerd. 2009. XROMM analysis of 3D skeletal movement during premaxillary protrusion in common carp. Society for Integrative and Comparative Biology annual meeting, Boston, MA, USA.

- Mostafiz, W, **NJ Gidmark** and SM Swartz. 2009. Histology and morphology of cyprinid pharyngeal dentition in relation to diet. Society for Integrative and Comparative Biology annual meeting, Boston, MA, USA. (poster)
- Gidmark, NJ**. 2008. The transition from water to sand and its effects on undulatory locomotion in sand lances (Actinopterygii: Ammodytidae). American Society of Ichthyologists and Herpetologists annual meeting, Montreal, Canada.
- Gidmark, NJ**. 2008. XROMM analysis of jaw protrusion kinematics in common carp, *Cyprinus carpio*. Division of Vertebrate Morphology (SICB) regional meeting, Storrs, CT, USA.
- Gidmark, NJ**, KL Staab, LP Hernandez and EL Brainerd. 2008. Role of the kinethmoid in jaw protrusion of common carp, *Cyprinus carpio*. Society for Integrative and Comparative Biology annual meeting, San Antonio, TX, USA.
- Gidmark, NJ**. 2007. Anamniotic snakes: how to make a fish move with serpentine locomotion. Brown University seminar series, Providence RI, USA.
- Gidmark, NJ**, J Strother, JM Horton and EL Brainerd. 2007. Burrowing kinematics of *Ammodytes hexapterus*, the Pacific Sand Lance. International Congress on Vertebrate Morphology, Paris, France (poster)
- Gidmark, NJ**, J Strother, JM Horton and EL Brainerd. 2007. Burrowing Kinematics of *Ammodytes hexapterus*, the Pacific Sand Lance. Society for Integrative and Comparative Biology, Phoenix, Arizona. (poster)
- Gidmark, NJ**, JA Strother, JM Horton, AP Summers, and EL Brainerd. 2007. Effects of the water-to-sand transition on the kinematics of burrowing in sand lances. Division of Vertebrate Morphology (SICB) regional meeting, Kingston, RI, USA.
- Gidmark, NJ**. 2007. On the evolution of trophic morphology in fishes, with comments on the pharyngeal arches. Brown University seminar series, Providence, RI, USA.
- Gidmark, NJ**. 2006. Burrowing kinematics of *Ammodytes hexapterus*, the Pacific sand lance. Division of Vertebrate Morphology (SICB) regional meeting, Providence, RI, USA.
- Gidmark, NJ** and AM Simons. 2006. Comparative evolution and variation of trophic morphology among and within two clades of North American cyprinids (Actinopterygii: Ostariophysi). University of Minnesota honors seminar series, St. Paul, MN, USA.
- Gidmark, NJ**. 2005. Phylogenetic relationships of major lineages of Cypriniformes (Actinopterygii: Teleostei) based on Ribosomal RNA sequence data. NSF Cypriniform Tree of Life REU symposium, Minneapolis, MN, USA.
- Gidmark, NJ**. 2005. Comparative evolution and variation of trophic morphology among and within two clades of North American cyprinids (Actinopterygii: Ostariophysi). American Society of Ichthyologists and Herpetologists annual meeting, Tampa, FL, USA.
- Simons, AM and **NJ Gidmark**. 2005. What we know about cypriniform relationships: a review of the evidence. American Society of Ichthyologists and Herpetologists annual meeting, Tampa, FL, USA.
- Gidmark, NJ**. 2005. Punctuated evolution of herbivorous morphologies in minnows (Actinopterygii: Ostariophysi). National Conference of Undergraduate Research, Lexington, Virginia, USA. (poster)

- Gidmark, NJ.** 2005. Character suites suggest punctuated evolution of herbivorous morphologies in minnows (Teleostei: Cyprinidae). Sigma Xi annual meetings, Montreal, Canada. (poster)
*Received award for “Superior Student Presentation,” top prize.
- Gidmark, NJ** and AM Simons. 2005. Character suites suggest punctuated evolution of herbivorous morphologies in minnows (Teleostei: Cyprinidae). American Fisheries Society annual meeting, Grand Rapids, MN, USA.
- Gidmark, NJ** and AM Simons. 2004. Evolution of trophic morphology in *Pimephales* and *Opsopoeodus*. American Society of Ichthyologists and Herpetologists annual meeting, Norman, OK.
- Gidmark, NJ,** E Jorgensen and D Lilja. 2004. Effects of gill parasites *Lernaeocera branchialis*, *Clavella adunca*, and *Caligus elongates* on the growth rates and body proportions of Atlantic Cod, *Gadus morhua*, off the coast of Heimaey, Vestmannaeyjar, Iceland. University of Iceland Arctic Biology Research Symposium, Reykjavik, Iceland.

Societies and Professional Memberships

American Society of Ichthyologists and Herpetologists
International Society of Vertebrate Morphologists
Society for Integrative and Comparative Biology

Peer Reviewer

Functional Ecology
Journal of Experimental Biology
Journal of Experimental Zoology
Zoology

Community Service and Outreach

2009-Present: Judge, Fall River High School Science Fair.
2009 -Present: Biologist, Westport River Watershed Alliance.
2003-2005: Community Advisor, Housing and Residential Life, U of MN.
2003-2006: College of Natural Resources Information Technology committee.
2003: Intern, Friends of the Boundary Waters Canoe Area Wilderness.

Foreign Language

Conversant in Spanish.

References

Elizabeth Brainerd, Professor, Brown University
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Andrew Simons, Associate Professor, University of Minnesota
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