BIOGRAPHICAL SKETCH

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NAME: Thomas J. Near

eRA COMMONS USER NAME: thomas.near

POSITION TITLE: Professor

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
Northern Illinois University, DeKalb, IL USA	B.S.	05/1992	Biological Sciences
Northern Illinois University, DeKalb, IL USA	B.A.	05/1992	History
Northern Illinois University, DeKalb, IL USA	M.S.	12/1995	Biological Sciences
University of Illinois, Urbana, IL USA	Ph.D.	05/2000	Ecology, Ethology, and Evolutionary Biology

NOTE: The Biographical Sketch may not exceed five pages. Follow the formats and instructions below.

A. Personal Statement

My research involves the use of genomic information to infer the history of evolutionary diversification in lineages of fishes. I am interested in reconstructing the tree of life of fishes using DNA sequences, and using phylogenetic trees to investigate the mechanisms that generate biodiversity. My work has investigated the origin of reproductive isolation and geographic patterns of speciation (1,2), adaptive radiation in Antarctic fishes (3,4), and reconstruction of phylogeny and timing of diversification among major lineages of ray-finned fishes (5-7).

B. Positions and Honors

Center for Population Biology Postdoctoral Fellow, University of California, Davis. July 2000-July 2002.

Phylogenetics Postdoctoral Fellow, Department of Evolution and Ecology University of California, Davis. July 2002-July 2003

Assistant Professor, Department of Ecology and Evolutionary Biology, University of Tennessee, Knoxville. August 2003-June 2006

Assistant Curator, Division of Vertebrate Zoology, Peabody Museum of Natural History, Yale University, New Haven, CT. August 2006-August 2011

Assistant Professor, Department of Ecology and Evolutionary Biology, Yale University, New Haven, CT. July 2006-June 2011

Associate Professor on Term (without tenure), Department of Ecology and Evolutionary Biology, Yale University, New Haven, CT, July 2011-June 2013

Associate Curator, Division of Vertebrate Zoology, Peabody Museum of Natural History, Yale University, New Haven, CT. September 2011-present

Associate Professor (with tenure), Department of Ecology and Evolutionary Biology, Yale University, New Haven, CT, July 2013-present

Head, Saybrook College, Yale University, New Haven, CT. July 2015-present

Professor, Department of Ecology and Evolutionary Biology, Yale University, New Haven, CT. July 2015-present

Chair, Department of Ecology and Evolution, Yale University, New Haven, CT. July 2018-present

C. Contribution to Science

The one incontrovertible thesis from Charles Darwin's formulation of evolutionary biology is that all life on Earth shares common ancestry. It was not until a century later that a set of methods, phylogenetic systematics, were developed to objectively infer the genealogical relationships among organismal lineages. I study the evolutionary diversification of fishes to reveal how evolution generates biodiversity. My research uses an integrative empirical strategy that relies on phylogenetic inferences and comparative methods to address long standing questions in evolutionary biology, specifically focusing on the interaction of ecological and phenotypic change in evolutionary radiations, the geographic context of lineage diversification, the evolution of reproductive isolation, and the inference of phylogenetic relationships and estimation of divergence times in ray-finned fishes (Actinopterygii).

Adaptive radiation in North American freshwater fishes and Antarctic marine fishes: Adaptive radiation, where a rapidly diversifying lineage evolves ecological and phenotypic diversity, is rarely investigated with clades that exhibit continental-wide geographic distributions. The degree that ecological and morphological disparity evolves in the context of allopatric speciation in adaptive radiations is unclear. Among the earliest interpretations of Darwin's Finches as an adaptive radiation invoked a history of allopatric diversification among separate islands of the Galapagos that was erased by range expansion subsequent to these initial rounds of speciation. A key to understanding continental adaptive radiations will involve discrimination between the evolution of morphological and ecological disparity among closely related species in allopatry that facilitates their sympatry, from the origin of these differences occurring in sympatry as a result of competitive character displacement.

My studies of adaptive radiation focus on two species-rich clades of percomorph teleosts, Antarctic marine notothenioids and North American freshwater darters. Using near complete species sampled time-calibrated molecular phylogenies for each of these lineages, my research shows that adaptive radiation can involve several nested and phylogenetically independent radiations that each involve rapid lineage diversification and the evolution of substantial phenotypic and ecological disparity. In the context of two very different geographic settings, comparative evolutionary analyses show that rates and magnitudes of phenotypic disparity are higher among species that co-occur with a greater number of other congeneric species, illustrating a distinct correlation between morphological evolution and species sympatry.

1. Near, T.J., Benard, M.F., 2004. Rapid allopatric speciation in logperch darters (Percidae: *Percina*). Evolution 58, 2798-2808.
2. Near, T.J., Bossu, C.M., Bradburd, G.S., Carlson, R.L., Harrington, R.C., Hollingsworth, P.R., Keck, B.P., Etnier, D.A., 2011. Phylogeny and temporal diversification of darters (Percidae: Etheostomatinae). Syst. Biol. 60, 565-595.
3. Near, T.J., Dornburg, A., Kuhn, K.L., Eastman, J.T., Pennington, J.N., Patarnello, T., Zane, L., Fernandez, D.A., Jones, C.D., 2012. Ancient climate change, antifreeze, and the evolutionary diversification of Antarctic fishes. Proc. Nat. Acad. Sci. USA 109, 3434-3439.
4. Daane, J. M., A. Dornburg, P. Smits, D. J. MacGuigan, M. Brent Hawkins, T. J. Near, H. William Detrich Iii, and M. P. Harris. 2019. Historical contingency shapes adaptive radiation in Antarctic fishes. Nature Ecol. & Evol.

Inferring phylogenetic relationships of ray-finned fishes (Actinopterygii): Half of all vertebrates are ray-finned fishes and most ray-finned fishes are percomorph teleosts. Despite the economic and scientific importance of ray-finned fishes, investigation of their phylogenetic relationships using molecular data is based primarily on mtDNA, and in general lags far behind that of other vertebrate lineages. I decided to change the vacant landscape of ray-finned fish molecular phylogenetics after I began my faculty position at Yale in 2006.

My work on the phylogenetics of actinopterygians is based on a dataset of DNA sequences from ten nuclear encoded exons sampled from more than 800 ray-finned fish species. In addition, I am in the process of collecting a dataset for "phylogenomic" analyses of actinopterygians that consists of 500 loci generated using anchored enrichment and next-generation sequencing.

Analyses of a DNA sequence dataset containing nine of our ten targeted genes result in the resolution of several long-standing phylogenetic problems in ray-finned fishes, including the resolution of Elopomorpha (tarpons, bonefish, and eels) as the earliest branching lineage of teleost fishes, resolution of the early diversification of euteleost fishes, and substantial phylogenetic resolution of the Percomorpha, a clade containing more than 17,000 species historically referred to as the "bush at the top of the [teleost] tree." The phylogeny was calibrated with information of the fossil record, resulting in a time tree that shows the most species-rich lineages of living teleosts originating in the Cretaceous through the Paleocene, a period of time spanning from 120 to 60 million years ago. ***Despite the fact that fish are usually viewed as "primitive" vertebrates, our analyses show that the lineages of fishes of which humans are most familiar have a fairly recent evolutionary origin, in a time period that we refer to as the "Second Age of Fishes."***

The new phylogenetic and temporal perspective on ray-finned fish diversification allows a critical reinterpretation of the role of putative key-innovations, such as the modified "labroid" pharyngeal jaw apparatus, on percomorph evolution, as well as revealing surprising phylogenetic results like the identification of the species-depauperate marine lineage *Pholidichthys* as the sister taxon of the species-rich freshwater Cichlidae. My analyses of percomorph diversification show that lineages exhibiting significantly high diversification rates are not typical coral reef clades, but include representative lineages of pelagic, freshwater, and benthic near-shore clades. ***My research shows that not one set of habitat types are associated with the evolution of percomorphs, but utilization of several distinct types of marine habitats characterize the evolutionary diversification of the most species-rich clade of living vertebrates.***

1. Near, T.J., Dornburg, A., Eytan, R.I., Keck, B.P., Smith, W.L., Kuhn, K.L., Moore, J.A., Price, S.A., Burbrink, F.T., Friedman, M., Wainwright, P.C., 2013. Phylogeny and tempo of diversification in the superradiation of spiny-rayed fishes. Proc. Nat. Acad. Sci. USA 110, 12738-12743.
2. Near, T.J., Dornburg, A., Tokita, M., Suzuki, D., Brandley, M.C., Friedman, M., 2014. Boom and bust: ancient and recent diversification in bichirs (Polypteridae: Actinopterygii), a relictual lineage of ray-finned fishes. Evolution 68, 1014-1026.
3. Near, T.J., Eytan, R.I., Dornburg, A., Kuhn, K.L., Moore, J.A., Davis, M.P., Wainwright, P.C., Friedman, M., Smith, W.L., 2012. Resolution of ray-finned fish phylogeny and timing of diversification. Proc. Nat. Acad. Sci. USA 109, 13698-13703.
4. Dornburg, A. and T. J. Near. 2021. The emerging phylogenetic perspective on the evolution of actinopterygian fishes. Annual Review of Ecology, Evolution, and Systematics 52:427-452.

Complete List of Published Work in MyBibliography:
http://www.ncbi.nlm.nih.gov/sites/myncbi/thomas.near.1/bibliography/48918822/public/?sort=date&direction=ascending