

Tetsuya Nakamura, Ph.D.

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Education

Mar 2007 **Ph.D. in Developmental Biology.** Osaka University
Mar 2002 **B.S. in Engineering.** Osaka University

Honors, Awards and Fellowships

Rutgers University

NSF grant 2022
Society of Developmental Biology Teaching and Junior faculty travel grant 2022
Japanese Ministry of International Affairs and Communications Inno-β 2021
Busch biomedical Grant 2020
Society of Developmental Biology Innovation Grant 2020
Society of Developmental Biology Teaching and Junior faculty travel grant 2019
Society of Developmental Biology Teaching and Junior faculty travel grant 2018
MBL Whitman Center Research Award 2018

University of Chicago

Travel award Pan-American Society for Evolutionary Developmental Biology 2017
Reported on the front page of *The New York Times* on August 18, 2016
(about my *Nature* paper)
MBL Whitman Center Research Award 2014
The research fellowship for abroad of the Uehara Memorial Foundation 2014
Postdoctoral Fellowship for Research Abroad (JSPS) 2012-2013

Osaka University

Reported on Japanese daily newspaper “Yomiuri” 2013
Paperpicks of *Developmental Cell* (recommended by Professor Clifford J. Tabin) 2011
Research fellowship for young scientists (Postdoctoral, JSPS) 2008
Research fellowship for young scientists (Doctoral, JSPS) 2005-2007

Research Experience

Rutgers University

2018-Present **Assistant Professor**
Dept. of Genetics

University of Chicago

2012-2017 **Postdoctoral Researcher**
Dept. of Organismal Biology and Anatomy,
Postdoctoral advisor: Professor Neil H. Shubin

Osaka University (Japan)
2008-2012 **Assistant Professor**
Dept. of Frontier Biosciences

Osaka University (Japan)
2007-2008 **Postdoctoral Scholar**
Dept. of Frontier Biosciences
Postdoctoral advisor: Professor Hiroshi Hamada

Osaka University (Japan)
2002-2007 **Graduate student**
Dept. of Frontier Biosciences
Ph.D. advisor: Professor Hiroshi Hamada

Osaka University (Japan)
1998-2002 **Undergraduate student**
Dept. of engineering

Funded Grants

- 2022** NSF grant *“The function of Gli proteins in the specification of ossification pathways in pectoral girdle development and evolution”*
(IOS, 2210072, \$1,578,200) 8/15/2022-07/31/2027
- 2021** Japanese Ministry of International Affairs and Communications
Innovation grant, Principal Investigator
“Restoring the 'Missing Link' in Evolution Back to Earth”
- 2020** Society of Developmental Biology Innovation Grant
Principal Investigator
“Establishment of a Four-Dimensional Single-Cell-Resolution Developmental Atlas (4D-SCREDA) to Decode Embryonic Development and Vertebrate Evolution”
- 2020** Busch Biomedical Grant
Principal Investigator
“The Genetic Mechanisms that Specify Two Distinct Types of Ossification”
- 2018** Whitman Center Research Award (Marine Biological Laboratory)
Principal Investigator
“Revealing the genetic mechanisms underlying diversities of dermal and endochondral bones in vertebrate evolution”
- 2016** Grants for Basic Science Research Projects (The Sumitomo Foundation)

- Principal Investigator
“The molecular mechanism to evolve fish fins into tetrapod limbs”
- 2015** The 44th KANAE grants (Kanae Memorial Foundation for the Promotion of the Medical Science)
Principal Investigator
“The molecular mechanisms of interactions and fusions of each tissue in the skate development”
- 2014** Whitman Center Research Award (Marine Biological Laboratory),
Principal Investigator
“Deeply conserved *Hox* collinearity autonomously produces diversified fin patterns and evolution depending on appendage size”
- 2011 - 2012** Grant-in-Aid for Scientific Research on Innovative Areas (JSPS)
Principal Investigator
“The mechanisms to produce 99.99% canalization in the development of left-right asymmetry”
- 2011 - 2012** Grant-in-Aid for Young Scientists B (JSPS)
Principal Investigator
“Asymmetric BMP signal determines the direction of heart and gut coiling”
- 2009 - 2011** Osaka university Grant for Interdisciplinary projects
Principal Investigator
“Understanding the developmental process as a balance of noise and stabilization”
- 2008** JSPS Grant-in-Aid for Scientific Research
“The mechanisms produce the robustness of left-right asymmetry”
- 2004 to 2007** JSPS Grant-in-Aid for Scientific Research
“A reaction-diffusion system determines left-right asymmetry”

Selected Publications (* Corresponding author)

Rees JM, Sleight VA, Clark SJ, **Nakamura T**, Gillis JA. Ectodermal Wnt signaling, cell fate determination, and polarity of the skate gill arch skeleton. *Elife*. 2023 Mar 20;12:e79964. doi: 10.7554/eLife.79964.

Marlétaz F*, Calle-Mustienes E, Acemel RD, Paliou C,.....,Navon D, Andrescavage A,....., **Nakamura T***, Tena JJ*, Lupiáñez DG*, Rokhsar DS*, and Gómez-Skarmeta JL. (*;corresponding authors)

The little skate genome and the evolutionary emergence of wing-like fin appendages
bioRxiv, 2022

Hawkins MB, Jandzik D, Tulenko FJ, Cass AN, **Nakamura T**, Shubin NH, Davis MC, and Stock DW.

An Fgf–Shh positive feedback loop drives growth in developing unpaired fins.
Proc Natl Acad Sci U S A, 2022 Mar 8;119(10):e2120150119.

Mori S* and **Nakamura T***

An evolutionarily conserved odontode gene regulatory network underlies head armor formation in suckermouth armored catfish.

Scientific Reports, 2021 Apr 13;12(1):6172

Enny A, Thompson A, Racicot B, Braasch I, and **Nakamura T***.

Cellular mechanisms of frontal bone development in spotted gar (*Lepisosteus oculatus*).
Dev Dyn. 2021, Nov;250(11):1668-1682

Nakamura T*, Schneider I* and Shubin NH*

Evolution: The deep genetic roots of tetrapod specific traits.

Current Biology, 2021, May 24;31(10):R467-R469

Enny A, Flaherty K, Mori S, Turner N, **Nakamura T***.

Developmental constraints on fin diversity.

Dev Growth Differ. 2020 Jun;62(5):311-325.

Turner N, Mikalauskaite D, Barone K, Flaherty K, Senevirathne G, Adachi N, Shubin NH and **Nakamura T***.

The evolutionary origins and diversity of the neuromuscular system of paired appendages in batoids

Proc. Biol. Sci. 2019, 2019 Nov 6;286(1914):20191571

Wood T and **Nakamura T***.

Problems in Fish-to-Tetrapod Transition: Genetic Expeditions into Old Specimens

Front. Cell Dev. Biology. 2018 Jul 16;6:70. doi: 10.3389/fcell.2018.00070.

Letelier J, de la Calle-Mustienes E, Pieretti J, Naranjo S, Maeso I, **Nakamura T**, Pascual-Anaya J, Shubin NH, Schneider I, Martínez-Morales JR, Gómez-Skarmeta JL. A conserved Shh cis-regulatory module highlights a common developmental origin of unpaired and paired fins.

Nat Genet. 2018 Mar 19. doi: 10.1038/s41588-018-0080-5.

Nakamura T, Gerhke AR, Lemberg J, Szymaszek J, Shubin NH*.

Digits and fin rays share common developmental histories.

Nature. 2016 Aug 17;537(7619):225-228.

[NEWS & VIEWS, *Nature* 2016, 08 September 537, 176–177]

Inaba Y, Shinohara K, Botilde Y, Nabeshima R, Takaoka K, Ajima R, Lamri L, Takeda H, Saga Y, **Nakamura T**, Hamada H*.

Transport of the outer dynein arm complex to cilia requires a cytoplasmic protein Lrrc6. *Genes Cells*. 2016 Jul;21(7):728-39.

Braasch I, Gehrke AR, Smith JJ, Kawasaki K, Manousaki T, Pasquier J, Amores A, Desvignes T, Batzel P, Catchen J, Berlin AM, Campbell MS, Barrell D, Martin KJ, Mulley JF, Ravi V, Lee AP, **Nakamura T** et.al

The spotted gar genome illuminates vertebrate evolution and facilitates human-teleost comparisons.

Nat Genet. 2016 Apr;48(4):427-37.

Nakamura T, Klomp J, Pieretti J., Schneider I., Gehrke AR., Shubin NH*.

Molecular mechanisms underlying the exceptional adaptations of batoid fins.

Proc Natl Acad Sci U S A. 2015 Dec 29;112(52):15940-5.

Pieretti J, Gehrke AR, Schneider I, Adachi N, **Nakamura T**, Shubin NH*.

Organogenesis in deep time: A problem in genomics, development, and paleontology.

Proc Natl Acad Sci U S A. 2015 Apr 21;112(16):4871-6

Gehrke AR, Schneider I, de la Calle-Mustienes E, Tena JJ, Gomez-Marin C, Chandran M, **Nakamura T**, Braasch I, Postlethwait JH, Gómez-Skarmeta JL, Shubin NH*.

Deep conservation of wrist and digit enhancers in fish.

Proc Natl Acad Sci U S A. 2015 Jan 20;112(3):803-8

Dong F, Shinohara K, Botilde Y, Nabeshima R, Asai Y, Fukumoto A, Hasegawa T, Matsuo M, Takeda H, Shiratori H, **Nakamura T** and Hamada H*.

Pih1d3 is required for cytoplasmic pre-assembly of axonemal dynein in mouse sperm.

Journal of Cell Biology, 2014 Jan 20;204(2):203-13

Inácio JM, Marques S, **Nakamura T**, Shinohara K, Meno C, Hamada H, Belo JA*. The dynamic right-to-left translocation of Cerl2 is involved in the regulation and termination of Nodal activity in the mouse node.

PLoS One. 2013. 8(3):e60406

Nakamura T, Hamada H

Fluorescent 2 color Whole mount *in situ* hybridization for a mouse embryo.

Protocol Exchange, 3 January 2013

Nakamura T*, Saito D, Kawasumi A, Shinohara K, Asai Y, Takaoka K, Dong F, Takamatsu A, Belo JA, Mochizuki A*, Hamada H.

Fluid flow and interlinked feedback loops establish left-right asymmetric decay of Cerl2 mRNA.

Nature Communications. 2012;3:1322.

Lei Z, Maeda T, Tamura A, **Nakamura T**, Yamazaki Y, Shiratori H, Yashiro K, Tsukita S, Hamada H*.

EpCAM contributes to formation of functional tight junction in the intestinal epithelium by recruiting claudin proteins.

Developmental Biology. 2012 Nov 15;371(2):136-45.

Nakamura T*, Hamada H.

Left-right patterning: conserved and divergent mechanisms.

Development. 2012 Sep;139(18):3257-62.

Kawasumi.A, **Nakamura T**, Iwai N, Yashiro K, Saijoh Y, Belo J, Shiratori H, Hamada H*.

Left-right asymmetry of Nodal activity in the node is translated into left-right asymmetry in the lateral plate of mouse embryos.

Developmental Biology, 2011 May 15;353(2):321-30.

Tanaka C, Sakuma R, **Nakamura T**, Hamada H, Saijoh Y*.

Long-range action of Nodal requires interaction with GDF1.

Genes and Development. 2007 Dec 15;21(24):3272-82.

Nakamura T, Mine N, Nakaguchi E, Mochizuki A, Yamamoto M, Yashiro K, Meno C, Hamada H*.

Generation of robust left-right asymmetry in the mouse embryo requires a self-enhancement and lateral-inhibition system.

Developmental Cell, 11, 495-504, 2006

Saijoh Y, Oki S, Tanaka C, **Nakamura T**, Adachi H, Yan YT, Shen MM, Hamada H*.

Two nodal-responsive enhancers control left-right asymmetric expression of Nodal.

Developmental Dynamics, 232(4);1031-1036; 2005

Takagi M, **Nakamura T**, Matsuda C, Hattori T, Wakitani S, Yoshida T*.

In vitro proliferation of human bone marrow mesenchymal stem cells employing donor serum and basic fibroblast growth factor.

Cytotechnology, 43:89-96,2003