Sungsik Kong

CONTACT Information 121 South Main Street, 11F, Box E, Institute for Computational and Experimental Research in Mathematics,

Brown University,

Providence, RI., 02906, USA

Summary

- I am a computational evolutionary biologist with trainings in biology, statistics, mathematics, computer science, and data science.
- My research focuses on method development in *phylogenetic tree and network inference*.
- I am adventurous and traveled in Asia for a year on foot, bicycle, and motorbike.

Professional Experience

Brown University, Providence, Rhode Island, USA

Present
Postdoctoral fellow
in Mathematics

Postdoctoral research associate

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e-mail: sungsik.kong@gmail.com

website: sungsik-kong.github.io

 $Institute\ for\ Computational\ and\ Experimental\ Research\ in\ Mathematics\ (ICERM)$

University of Wisconsin-Madison, Madison, Wisconsin, USA

2023-2024

Wisconsin Institute for Discovery Mentor: Dr. Claudia Solís-Lemus

EDUCATION

The Ohio State University, Columbus, Ohio, USA

2018-2022

Ph.D. in Evolution, Ecology, and Organismal Biology

Presidential fellow

2022

<u>Dissertation</u>: Towards the network of life: Phylogenetic networks as a tool to understand complex evolutionary histories

Advisor: Dr. Laura Kubatko

University of Toronto, Toronto, Ontatio, Canada

2013-2015

M.Sc. in Ecology and Evolutionary Biology

<u>Thesis</u>: On the use of Median-Joining networks: A philosophical and empirical evaluation of its suitability in evolutionary biology

Advisor: Dr. Robert Murphy

University of Toronto, Toronto, Ontatio, Canada

2006-2012

B.Sc. in Zoology and Ecology and Evolutionary Biology

Undergraduate thesis advisors: Drs. Robert W. Murphy and Deborah A. McLennan

PUBLICATIONS

Total number: 20

h-index: 7 [Google scholar]

*Correspondence; [‡]Co-correspondence; [†]Equal contribution

Selected peer-reviewed journal articles

- [20] Kong S*, Swofford DL, and Kubatko LS. (Accepted, $Systematic\ Biology$) Inference of phylogenetic networks from sequence data using composite likelihood. Preprint available on bioRxiv at 10.1101/2022.11.14.516468v1
- [19] Kong S*, Sánchez-Pacheco SJ, and Murphy RW. (2023) Median-Joining Networks and Bayesian phylogenies often do not tell the same story. *Bulletin of the Society of Systematic Biologists* 2:1 1–13 doi:10.18061/bssb.v2i-1.9625
- [18] Kong S (2022) Digest: Frequent hybridization in *Darevskia* rarely leads to the evolution of asexuality. *Evolution* 76:9 2216–2217 doi:10.1111/evo.14587

- [17] Kong S[†], Pons JC[†], Kubatko LS, and Wicke K. (2022) Classes of phylogenetic networks and their mathematical and biological significance. *Journal of Mathematical Biology* 84:47 doi:10.1007/s00285-022-01746-y
- [16] Kong S and Kubatko LS. (2021) Comparative performance of popular methods for hybrid detection using genomic data. Systematic Biology 70:5 891–907 doi:10.1093/sysbio/syaa092
- [15] Sánchez-Pacheco SJ[‡], Kong S[‡], Pulido-Santacruz P, Murphy RW, and Kubatko L. (2020) Median-joining network analysis of SARS-CoV-2 genomes is neither phylogenetic nor evolutionary. Proc. Natl. Acad. Sci. U.S.A 117:23 12518–12519 doi:10.1073/pnas.2007062117
- [14] Kong S[†], Sánchez-Pacheco S[†], and Murphy RW. (2016) On the use of Median-Joining Networks in evolutionary biology. *Cladistics* 32: 691−699 doi:10.1111/cla.12147

Collaborative peer-reviewed journal articles

- [13] Peng J, Kong S, and Kubatko L. (In Press) A likelihood ratio test for hybridization under the multispecies coalescent. Bulletin of the Society of Systematic Biologists; Preprint available on bioRxiv at doi:10.1101/2023.06.20.545699
- [12] Fu M, Eimes JA, Kong S, Lamichhaney S, Waldman B (2023) Identification of major histo-compatibility complex genotypes associated with resistance to an amphibian emerging infectious disease. *Infection, Genetics and Evolution* 105470 doi:10.1016/j.meegid.2023.105470
- [11] Glon H, Häussermann V, Brewin P, Brickle P, Kong S, Smith M, and Daly M. (2023) There and back again: The unexpected journeys of *Metridium* de Blainville, 1824 between the old oceans and throughout the modern world. *Biological Bulletin* 244:1 doi:10.1086/723800
- [10] Nguyen HQ, Ho P-T, **Kong S**, Bae Y, Pham TH, and Jang Y. (2022) A time-calibrated mitogenomic phylogeny suggests that Korean *Hyalessa fuscata* is a bridge between Chinese and Japanese *H. maculaticollis. Journal of Genetics* 102:9 doi:10.1007/s12041-022-01405-7
- [9] Nguyen HQ, Kim E, Bae Y, Chae S, Ji S, Heo J, Kong S, Nguyen TK, Pham TH, and Jang Y. (2022) An effective method for accurate life-stage delimitation of cicadas. *Journal of Asia-Pacific Entomology* 101952 doi:10.1016/j.aspen.2022.101952
- [8] Glon MG, Broe MB, Crandall KA, Daly M, Kong S, Thoma RF, and Freudenstein JV. (2022) Anchored hybrid enrichment resolves the *Lacunicambarus* (Decapoda: Cambaridae) phylogeny. *Journal of Crustacean Biology* 42:1 ruab073 doi:10.1093/jcbiol/ruab073
- [7] Kim M, Nguyen HQ, Yi Y, Ahn J, Kim YE, Jang S, Kim S, Kong S, and Borzée A. (2020) Policy recommendation on whaling, trade and watching of cetaceans in the Republic of Korea. Biodiversity Journal 11: 255–258 doi:10.31396/Biodiv.Jour.2020.11.1.255.258
- [6] Weiringa JG, Boot MR, Dantas-Queiroz MV, Duckett D, Fonseca EM, Glon H, Hamilton N, Kong S, Lanna FM, Mattingly KZ, Parsons DJ, Smith ML, Stone BW, Thompson C, Zuo L, and Carstens BC. (2020) Does habitat stability structure intraspecific genetic diversity? It's complicated... Frontiers in Biogeography e45377 doi:10.21425/F5FBG45377
- [5] Borzée A, Purevdorj Z, Kim YI, Kong S, Choe M, Yi Y, Kim K, Kim A, and Jang Y. (2020) Breeding preferences in the Treefrogs *Dryophytes japonicus* (Hylidae) in Mongolia, the northern limit of their range. *Journal of Natural History* 53: 2685-2698 doi:10.1080/00222933.2019.1704458
- [4] Bae Y, Kong S, Yi Y, Jang Y, and Borzée A. (2019) Additional new type of threat to Hynobius salamander eggs: predation by loaches (Misgurnus sp.) in agricultural wetlands. Animal Biology 69:4 451–461 doi:10.1163/15707563-20191070
- [3] Groffen J, Kong S, Jang Y, and Borzée A. (2019) The invasive American bullfrog (*Lithobates catesbeianus*) in the Republic of Korea: history and recommendation for population control. *Management of Biological Invasions* 10:3 517–535 doi:10.3391/mbi.2019.10.3.08

- [2] Borzée A, Kong S, Didinger C, Nguyen HQ, and Jang Y. (2018) A ring-species or a ring of species? Phylogenetic relationship between two treefrog species around the Yellow Sea: Dryophytes suweonensis and D. immaculatus. The Herpetological Journal 28: 160–170
- [1] Kim K, **Kong S**, Kim YI, Borzée A, Bae Y, and Jang Y. (2018) Japanese hard ticks (*Ixodes nipponensis*) parasitizing on the endangered leopard cat (*Prionaliurus bengalensis euptilura*) in the Republic of Korea. *Animal Systematics, Evolution and Diversity* 34:1 23–26 doi:10.5635/ASED.2018.34.1.032

Policy recommendation

[1] Borzée A, Nguyen HQ, Ahn J, Kim M, Kim S, Jang S, **Kong S**, Kim YE, and Yi Y. (2017) Policy recommendation on the negative impact of infrastructure development on the population of endangered Long-Tailed Goral in Oseck-Kkeutchong. *Society for Conservation Biology Korean Chapter*

Submitted (or very close to be submitted)

- [1] Kong S, Solís-Lemus CR, and Tiley GP. (In Review) Phylogenetic networks empower speciation biology
- [2] Fonseca EM, Camurugi F, Magalhães FM, **Kong S**, Colli GR, Werneck FP, and Carstens BC. (In Preparation) Geographic distance, rivers, and historical climate explain genetic structure and differentiation in a widely distributed tropical skink
- [3] Kong S, Kolbow N, Chafin T, and Solís-Lemus CR. (In Preparation) SNaQ2: Improved scalability for phylogenetic network inference

Talks and Presentations

Invited talks (*Virtual presentation)

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[1]	Creighton University, Omaha, NE., USA Department of Mathematics Colloquium Series	Scheduled in 2024
[2]	ICERM, Brown University, Providence, RI., USA From Phylogenetics to Phylogenomics: Mathematical and Statistical Challengesin the era of Big Data Workshop	Scheduled in 2024
[3]	Joint Congress on Evolutionary Biology, Montréal, QC., Canada Networks in Population Genetics and Phylogenetics: Theory, Methods, and Applications Symposium	2024
[4]	University of Hawai'i at Mānoa, Honolulu, HI., USA Algebraic Methods in Phylogenetics Workshop, Just-in-time talk	2024
[5]	University of Science and Technology of Hanoi, Vietnam Academy of Science and Technology, Hanoi, Vietnam [press]	2024
[6]	Sungshin Women's University, Seoul, South Korea	2024
[7]	Ewha Womans University, Seoul, South Korea	2024
[8]	The International Society for Computational Biology (ISCB), Society for Molecular Biology and Evolution (SMBE)* $EvolCompGen\ webinar\ series$	2023
[9]	Society for Industrial and Applied Mathematics, New York-New Jersey-Pennsylvania Section (SIAM-NNP), New Jersey Institute of Technology (NJIT), Newark, NJ., USA Mathematics of Evolution Minisymposium	2023
[10]	University of Wisconsin-Madison, WI., USA [video] UW-Madison Fall 2023 Evolution Seminar Series	2023

[11]	University of Wisconsin-Madison, WI., USA UW-Madison Postdoctoral Research Symposium Blitz Talks Competition		2023
[12]	Taming the BEAST, Squamish, BC., Canada Squamish BEAST Tamers		2023
[13]	Botany Meeting, Boise, ID., USA Seeing the Network for the Trees Symposium		2023
[14]	Algorithms and Complexity in Phylogenetics * $[{\rm video}]$		2022
[15]	Indiana University, Bloomington, IN., USA		2022
[16]	University of California San Diego, CA., USA*		2022
[17]	Evolution Meeting, Cleveland, OH., USA Society of Systematic Biologists (SSB) Ernst Mayr Award Competition		2022
[18]	Louisiana State University, Baton Rouge, LA., USA Department of Biological Sciences Seminar		2022
[19]	The Korean Association of Biological Sciences, Seoul, South Korea* The Ecological Society of Korea Section		2021
[20]	Workshop in Mathematical and Computational Biology* [video] $Bioinformatics\ Section$		2021
[21]	Misericordia University, Dallas, PA., USA* Biology Seminar Series		2021
[22]	The Stone Laboratory, Gibraltar Island, OH., USA EEOB 1930 Introduction to Biological Studies-Aquatic Biology		2019
[23]	Ewha Womans University, Seoul, South Korea Eco-science/Eco-creative Graduate Seminar		2016
[24]	Ewha Womans University, Seoul, South Korea Laboratory of Behavior and Ecology Weekly Seminar		2013
Regi	ular talks		
[1]	University of Wisconsin-Madison, WI., USA Friday@4		2024
[2]	University of Wisconsin-Madison, WI., USA Wisconsin Institute for Discovery Symposium		2023
[3]	Evolution Meeting*		2021
[4]	The Ohio State University, Columbus, OH., USA* Evolution, Ecology, and Organismal Biology (EEOB) Annual Darwin Series		2021
[5]	The Ohio State University, Columbus, OH., USA Evolution & Ecology Club	2019,	2020
[6]	SSB Standalone Meeting, Gainesville, FL., USA		2020
[7]	Ewha Womans University, Seoul, South Korea Animal Communication Symposium		2017

Poster presentations [1] Intelligent Systems for Molecular Biology (ISMB), ISCB, Madison, WI., USA 2022 Best Poster Award Winner [2] Evolution Meeting, Providence, RI., USA 2019 2017 [3] The Korean Association of Biological Sciences, Yong-In, South Korea [4] Korean-American Scientists and Engineers Association (KSEA), 2014 Young Generation Technical and Leadership Conference (YGTLC), Houston, TX., USA [5] University of Toronto, Toronto, ON., Canada 2012 Department of Ecology and Evolutionary Biology undergraduate research Fair Academic visit 2022 [1] University of Wisconsin–Madison, WI., USA Wisconsin Institute for Discovery Visiting Ph.D. student Mentor: Dr. Claudia Solís-Lemus [2] Louisiana State University, Baton Rouge, LA., USA 2022 Department of Biological Sciences Visiting Ph.D. student Mentor: Dr. Jeremy Brown Research experience 2013, 2016-2017 [1] Ewha Womans University, Seoul, South Korea Division of Eco-science Researcher Mentors: Drs. Jae Chun Choe and Yikweon Jang [2] University of Toronto, ON., Canada 2011 - 2013Faculty of Forestry Work-study student & Biodiversity technician Mentors: Dr. Sandy Smith and Eric Davies 2012 [3] Royal Ontario Museum, Toronto, ON., Canada Centre for Biodiversity and Conservation Biology Student researcher Mentor: Dr. Robert Murphy 2011 - 2012[4] University of Toronto, ON., Canada Department of Ecology and Evolutionary Biology Student researcher Mentor: Dr. Deborah McLennan [5] University of Toronto, ON., Canada 2010 Cities Centre, Department of Geography Student data collector Mentor: Dr. Kristian Larsen Fieldwork experience [1] Indonesia, Laos, Indonesia, Mongolia, China, and South Korea 2016 - 2017[2] Greater Toronto Area (GTA) 2010 - 2013International workshops Instructor[1] Methodological Advances in Reticulate Evolution, Botany Meeting, Boise, ID., USA 2023

Teaching assistant (†Lead teaching assistant)
[1] Workshop on Molecular Evolution, Woo

Academic

EXPERIENCE

TEACHING AND

Mentoring

EXPERIENCE

[1] Workshop on Molecular Evolution, Woods Hole, MA., USA†
Instructed Introduction to Computing Laboratory

[2] Squamish BEAST Tamers, Taming the BEAST, Squamish, BC., Canada

2023

2024

Project title: Detecting shifts in the evolutionary process in SARS-CoV-2 genomes

[5] Tulio Soares and Ellen Southam

Co-supervised with Dr. Pedro Bernardo at

Co-supervised with Dr. Pedro Bernardo at
University of Toronto and Royal Ontario Museum

[6] Shreeram Senthivasan Co-supervised with Drs. Pedro Bernardo, Santiago Sánchez-Pacheco, and Robert Murphy at University of Toronto and Royal Ontario Museum

Miscellaneous

[1] Daruma Eco-Farm, Bang Phra, Si Racha District, Chon Buri, Thailand
 [2] Cheong-Shim International School English Camp, Ga-Pyeong, South Korea
 2009

Conference and	Part	icipation with a role (*Virtual event)	
WORKSHOP PARTICIPATION	[1]	Joint Congress on Evolutionary Biology, Montréal, Quebec, Canada Participated as EvoAllies for safe and inclusive meeting	2024
	[2]	Evolution Meeting, Albuquerque, NM., USA SSB Mayr Award Abstract Reviewer & Society of Study of Evolution (SSE) Hamilton Award Judge	2023
	[3]	ISMB, ISCB, Madison, WI., USA Technical Moderator	2022
	[4]	Evolution Meeting, Cleveland, OH., USA SSB Symposium Co-organizer (with Dr. Md Rejuan Haque) Symposium title: Towards the network of life: Phylogenetic networks as a tool to understand complex evolutionary histories.	2022
	[5]	Evolution Meeting* $Chair/Moderator \text{ in multiple Faux-Live Sessions}$	2021
	Part	icipant	
	[1]	Algebraic Methods in Phylogenetics Workshop, University of Hawai'i at Mānoa, Honolulu, HI., USA [press]	2024
	[2]	Wisconsin Institute for Discovery Symposium, University of Wisconsin-Madison, WI., USA	, 2023
	[3]	Midwest Machine Learning Symposium, University of Illinois Chicago, IL., USA	2023
	[4]	Workshop in Mathematical and Computational Biology *	2022
	[5]	Annual Conference of the Korean Association of Biological Sciences, South Korea *	2021
	[6]	i Evo Bio (Informatics for Phylogenetics, Evolution and Bio diversity), Evolution Meeting *	2021
	[7]	Workshop in Mathematical and Computational Biology *	2021
	[8]	SMRT Leiden 2021 – Young Investigator Virtual Conference *	2021
	[9]	Virtual Asilomar 2021, American Society of Naturalists [⋆]	2021
	[10]	Future of Systematics Workshop at SSB Standalone Meeting, University of Florida, Gainesville, FL., USA	2020
	[11]	SSB Standalone Meeting, Gainesville, FL., USA	2020
	[12]	Evolution Meeting, Providence, RI., USA	2019
	[13]	Midwest Phylogenetics Workshop, Itasca Biological Station, University of Minnesota, MN., USA	2019
	[14]	Annual Conference of the Korean Association of Biological Sciences, Yong-In, South Korea	2017
	[15]	Society for Conservation Biology (SCB) Asia Section, Workshop on Conservation policy, Bangkok, Thailand	2017
	[16]	World Congress of Herpetology, Hangzhou and Tonglu, China	2016
	[17]	Phylogenomics Symposium and Software School at SSB Standalone Meeting, University of Michigan, Ann Arbor, MI., USA	2015

DIVERSITY AND	Participation with a role	
INCLUSION ACTIVITIES	[1] Joint Congress on Evolutionary Biology, Montréal, Quebec, Canada Participated as EvoAllies for safe and inclusive meeting	2024
	[2] International Mixer, Evolution Meeting* $Moderator$	2021
	[3] Decolonizing Evolution Workshop, Evolution Meeting* $Moderator$	2021
	[4] Strategies for Responding to Harassment and Bullying: Improving Workplace Climate, Evolution Community Resources for Early Career Researchers 2020 (ECR ²)* Moderator	2020
	[5] Fireside ECR Chat, ECR 2* $Moderator$	2020
	Participant	
	[1] International Mixer, Evolution Meeting, Cleveland, OH., USA	2022
	[2] Transformative Justice within Academia: A radical institutional reflection, The Centre for Criminology and Sociolegal Studies Graduate Student Conference, University of Toronto*	2021
Grants and Awards	All in US Dollars unless stated. †Canadian Dollar; ‡Converted from South Korean Won Total amount of funding received up to date $\approx\!$ US\$87,000	
	Highlights	
	[1] ICERM Semester Postdoctoral Fellowship, Brown University [\$36,600]	2024
	[2] The Presidential Fellowship, The Ohio State University [\$36,500]	2022
	[3] SSB Ad Hoc Funds [\$3,000]	2021
	[4] SSE Graduate Research Excellence Grant [\$1,800] R.C. Lewontin Award competition	2020
	[5] University of Toronto Graduate Fellowship	2013-2015
	$[6]$ E.M. Walker Graduate Award in Biodiversity, University of Toronto $[\$2,\!615\dagger]$	2014
	Other grants	
	[1] Funding for participation in Algebraic Methods in Phylogenetics Workshop (NSF)	2024
	[2] UW-Madison Department of Plant Pathology Travel Award [\$500]	2024
	[3] EvolCompGen Best Poster Award, ISMB, ISCB [\$100]	2022
	[4] EEOB Graduate Development Grant, The Ohio State University [Funded]	2022
	[5] EEOB Graduate Evolution & Ecology Student Organization (GEES) Career Development Grant, The Ohio State University [\$200]	2022
	[6] Council of Graduate Students (CGS) Career Development Grant, The Ohio State University [\$350]	2022
	[7] EEOB Darwin Talk Society Membership Grant, The Ohio State University [\$70]	2021
	[8] EEOB Graduate Development Grant, The Ohio State University [Funded]	2021
	[9] Funding for participation in Future of Systematics Workshop, SSB Standalone Meeting (NSF) [\$500]	2020

	[10] Funding for participation in Midwest Phylogenetics Workshop (NSF) [Funded]	2019
	[11] EEOB Graduate Development Grant, The Ohio State University [Funded]	2019
	[12] University of Toronto Undergraduate Bursaries [† \approx \$3,000]	2010-2012
OUTREACH AND SERVICE	[1] The Society's Graduate Student Research Awards Reviewer	2024
	[2] Junior science café, Morgridge Institute for Research, WI., USA Scientist	2023
	[3] EEOB 8894: EEOB Graduate seminar, The Ohio State University Invited Panelist	2020
	[4] Museum of Biological Diversity's open house, The Ohio State University $Volunteer$	2019
	[5] Department of EEOB, The Ohio State University Graduate studies Committee	2020-2021
	[6] Department of EEOB, The Ohio State University Admissions Committee	2019-2020
	[7] SCB, South Korean Chapter Communication Officer	2016-2017
	[8] Kuang Si Butterfly Park, Ban Thapene, Luang Prabang District, Laos Volunteer Biologist	2016, 2022
Dans Daywayy		

Peer-Review ACTIVITIES

Review Editor on the Editorial Board of Evolutionary Systems Biology (specialty section of Frontiers in Systems Biology). Reviewer at Systematic Biology; Molecular Biology and Evolution; Genome Biology and Evolution; Scientific Reports; Molecular Phylogenetics and Evolution; Philosophical Transactions B; Infection, Genetics and Evolution; PLOS Computational Biology; F1000Research; Journal of Mathematical Biology; Bulletin of Mathematical Biology; Ecology and Evolution; Zoological Systematics; Functional & Integrative Genomics

ACTIVE Professional Memberships

Society of Systematic Biologists; Society for Study of Evolution; International Society for Computational Biology

SKILLS

Programming: UNIX, R, Python, Julia, HTML, JavaScript Typesetting: LATEX, R Markdown, Jupyter Notebook Languages: English (Fluent), Korean (Native), Japanese (Intermediate)

References

- [1] Dr. Laura S. Kubatko (Ph.D. advisor) Department of Statistics and Department of Evolution, Ecology, and Organismal Biology The Ohio State University 219 Cockins Hall, Columbus, OH., 43210, USA lkubatko@stat.osu.edu $+1\ 614-247-8846$
- [2] Dr. Claudia Solís-Lemus (Postdoc advisor) Wisconsin Institute for Discovery Department of Plant Pathology University of Wisconsin-Madison 330 N. Orchard St., Madison, WI., 53715, USA

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[3] Dr. Elizabeth Allman
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 University of Alaska Fairbanks
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