

Program

Monday, 17 June National Academy of Sciences

- 09:00–09:20 **Opening Remarks & Welcome**
Marcia McNutt, NAS President (recorded message)
Pavel Kabat, HFSP Secretary-General
- 09:20–10:40 **Oral Session 1**
Chair: Jörg Overmann
- Buzz-pollination: bee-flower vibrational coupling and robo-buzzer prototype development
Noah Jafferis, UMass Lowell, Lowell, United States of America, Research Grant – Program 2022
- Bioadhesive ultrasound hydrogel integrated wearable ultrasound transducer for long-term neuromodulation
Jinmo Jeong, The University of Texas at Austin, Austin, United States of America, Cross-disciplinary Fellowship 2022
- Energy landscapes of muscle-tendon dynamics
David Labonte, Imperial College London, London, United Kingdom, Young Investigator Grant 2020
- Selection of optimal hydraulic modes in the network forming slime mold *physarum polycephalum*
Marcus ROPER, University of California, Los Angeles, Los Angeles, United States of America, Research Grant – Program 2021
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- 10:40–11:10** **Coffee Break**
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- 11:10–12:30 **Oral Session 2**
Chair: Fabio Benfenati
- Mechanistic insights into the fluidity and rheological behavior of epithelial tissues using biophysical models
Dapeng Bi, Northeastern University, Boston, United States of America, Research Grant – Program 2022
- Death & chemotaxis—unraveling the dynamics of bacterial community migration in the presence of phages
Alejandro Martínez-Calvo, Princeton University, Princeton, United States of America, Cross-disciplinary Fellowship 2021
- Active matter model inspired by t-cell dynamics in lymph nodes
Daniel Parisi, Instituto Tecnológico de Buenos Aires (ITBA), CONICET, Buenos Aires, Argentina, Research Grant – Program 2020
- Septin binding to shigella induces a stress response to restrict growth
Gizem Ozbaykal-Guler, London School of Hygiene & Tropical Medicine, London, United Kingdom, Long-Term Fellowship 2021

12:30–13:30

Lunch Break

13:30–14:00

Poster Talk 1

Chair: Kurt Krause

Highly parallel and programmable single-molecule force spectroscopy by light-guided patterning

Hansol Choi, Boston Childrens Hospital, Boston, United States of America, Cross-disciplinary Fellowship 2023

Oprf impacts pseudomonas aeruginosa biofilm matrix edna levels in a nutrient-dependent manner

Boo Shan Tseng, University of Nevada, Las Vegas, Las Vegas, United States of America, Research Grant – Early Career (formerly Young Investigator Grant) 2021

The regulation of social conflict in the indian jumping ant (*harpegnathos saltator*)

Ching-Han Lee, New York University, New York, United States of America, Long-Term Fellowship 2023

Coevolution of body morphology, neural circuits, and behavior

Jasper Phelps, Swiss Federal Institute of Technology Lausanne, Lausanne, Switzerland, Long-Term Fellowship 2023

Disentangling microbiome effects on plant development

Alejandra Hernandez Teran, University of California, Irvine, Irvine, United States of America, Long-Term Fellowship 2023

Molecular mechanism of phenotypic memory for bacterial growth in fluctuating environments

Edo Kussell, New York University, New York, United States of America, Young Investigator Grant 2011

Integrating plant genetics and bee foraging behaviour to understand the co-evolution of plant-pollinator interactions

Jaya Sravanthi Mokkalapati, The Pennsylvania State University, State College, United States of America, Research Grant – Program 2021

Inhibiting dengue virus infection: role of 25-hydroxycholesterol in membrane fusion dynamics

Rahul Roy, Indian Institute of Science, Bengaluru, India, Research Grant – Program 2020

Regulation of cell identity and identity breakers

Amir Orian, Technion – Israel Institute of Technology, Haifa, Israel, Career Development Award 2005

14:00–15:40

Oral Session 3

Chair: Masahide Kikkawa

The amino acid alphabet very likely passed through an acidic intermediate
Stephen Fried, Johns Hopkins University, Baltimore, United States of America, Research Grant – Program 2023

The structure of the tad pilus alignment complex demonstrates that it forms a trans-periplasmic conduit for pilus extension
Julien Bergeron, King's College London Guy's Campus, London, United Kingdom, Research Grant – Early Career (formerly Young Investigator Grant) 2021

The transcriptional program of golgi biogenesis
Roman Polischchuk, TIGEM, Pozzuoli, Italy, Research Grant – Program 2021

Revealing the molecular mechanism of pili nanofilaments hidden bacterial hairs as an on-off switch to power nature's 'electric grid' by controlling the secretion of electron conductive nanowires: assembly machinery, functions, and electron pathways
Nikhil Malvankar, Yale University, New Haven, United States of America, Research Grant – Program 2024

Floral asymmetry: distinguishing left from right
Nicola Illing, University of Cape Town, Rondebosch, South Africa, Research Grant – Program 2021

15:40–16:00

Coffee Break

16:00–17:20

Oral Session 4

Chair: Juliet Daniel

An angiogenic switch regulates the transition from a wound healing to a blastema state during axolotl limb regeneration
Aaron Savage, Harvard University, Cambridge, United States of America, Long-Term Fellowship 2022

Nuclear envelope budding as an alternative route to export mrna
Sofia Zaganelli, University of Colorado Boulder, Boulder, United States of America, Long-Term Fellowship 2021

Preventing aberrant replication in cancer cells
Mirit Aladjem, NCI Cancer Research Laboratory, Rockville, United States of America, Long-Term Fellowship 1993

Optimal mechanical design of biological "needles": from radiolaria spines to whale tusks
Mattia Bacca, University of British Columbia, Vancouver, Canada, Research Grant – Early Career (formerly Young Investigator Grant) 2020

Tuesday, 18 June
National Academy of Sciences

08:30–10:10

Oral Session 5

Chair: Anat Ben Zvi

Avian sensing of airflow through feather vibration

Shane Windsor, University of Bristol, Bristol, United Kingdom, Research Grant – Program 2021

Selfcure: evolutionary and cognitive processes underlying self-medication of immune-challenged bats

Ralph Simon, University of Erlangen–Nuremberg, Erlangen, Germany, Research Grant – Program 2023

Getting in shape—unraveling the morphodynamics of microbial collectives

Alejandro Martínez-Calvo, Princeton University, Princeton, United States of America, Cross-disciplinary Fellowship 2021

Bioinformatic investigations reveal a complex evolutionary history of arthropod intermediate filaments

Supanat Phuangphong, Harvard University, Cambridge, United States of America, Research Grant – Program 2022

Three sides of the same coin: unifying context-dependencies of ecological interactions

Oliver Meacock, UNIL – Université de Lausanne, Lausanne, Switzerland, Long-Term Fellowship 2022

10:10–10:30

Coffee Break

10:30–11:50

Oral Session 6

Chair: Aurora Martinez

Electrostatic atlas of noncovalent interactions built in metal–organic frameworks

Steven Boxer, Stanford University, Stanford, United States of America, Research Grant – Program 2022

The formation, expansion and dissolution of α -synuclein inclusions is modulated by a genetic network acting through phase separation

Eleanna Kara, Rutgers–New Brunswick, New Brunswick, United States of America, Long-Term Fellowship 2017

Adventures in protein–protein and protein–membrane biophysics – highlights from buck lab. Over the last 20 yrs

Matthias Buck, Case Western Reserve University School of Medicine, Cleveland, United States of America, Long-Term Fellowship 1994

Multiple serotonin release modes under distinct molecular control

Özge Demet Özçete, Harvard Medical School, Boston, United States of America, Long-Term Fellowship 2022

11:50–12:20

Poster Talk 2

Chair: Mart Saarma

A comprehensive mathematical framework for computational biology: dynamical graph grammars for cytoskeleton in plant cells and in synapses
Eric Mjolsness, University of California, Irvine, Irvine, United States of America, Research Grant 2018

Mapping structural and functional connectivity of the distributed sensory system in chiton armor
Ling Li, University of Pennsylvania, Philadelphia, United States of America, Research Grant – Program 2023

Ant aggregation pheromones: from social behavior to neural coding
Matteo Rossi, The Rockefeller University, New York, United States of America, Long-Term Fellowship 2023

Exploring neural crest cell dynamics in newt limb regeneration
Miyuki Suzuki, California Institute of Technology, Pasadena, United States of America, Long-Term Fellowship 2022

Cell-state specific remodeling of the malate aspartate shuttle
Julia Stefanie Brunner, Memorial Sloan-Kettering Cancer Center, New York, United States of America, Long-Term Fellowship 2021

Charting the origin, diversity and biogeography of small proteins in the global ocean microbiome
Samuel Miravet Verde, ETH Zürich, Zürich, Switzerland, Long-Term Fellowship 2023

The role of host-odor sensing in the evolution of mosquito vector competency: a friend or a foe
Tina Mukherjee, Institute For Stem Cell Science and Regenerative Medicine, Bengaluru, India, Research Grant – Program 2023

Robust folding of the expanding pupal wing under confinement
Soichi Hirokawa, IBDM (Institute of Developmental Biology of Marseilles), Marseille, France, Long-Term Fellowship 2023

Rock-paper-scissors dynamics between mobile genetic elements
Jana S. Huisman, Massachusetts Institute of Technology, Cambridge, United States of America, Long-Term Fellowship 2023

12:30–13:30

Lunch Break

13:30–18:30

High-level event: Frontier Life Science in the USA and The 2024 HFSP Nakasone Award Ceremony

Detailed program available at the meeting

18:30–19:30

35th Anniversary Reception

A meet and greet in celebration of HFSP's 35th Anniversary

Wednesday, 19 June

JW Marriott Hotel

08:30–10:10

Oral Session 7

Chair: Almut Kelber

Aging impact on the mouse prefrontal circuit

Tsukasa Kamigaki, Nanyang Technological University, Singapore, Singapore, Long-Term Fellowship 2012

Science over the abyss: knitting bridges with butterflies

Caroline Bacquet, Regional College Amazon Ikiam, Tena, Ecuador, Research Grant – Program 2022

Antiviral innate immune memory in alveolar macrophages following SARS-COV-2 infection

Alexander Lercher, The Rockefeller University, New York, United States of America, Long-Term Fellowship 2021

Robotic imaging reveals supply-chain design of plant-mycorrhizal trade

Thomas Shimizu, AMOLF Institute, Amsterdam, Netherlands, Research Grant – Program 2019

The aphrodisiac gut: dissecting the multi-level connection involved in yeast mating promotion in wasp guts through a multi-disciplinary collaboration

Daniel Segre, Boston University, Boston, United States of America, Research Grant – Program 2021

10:10–10:30

Coffee Break

10:30–11:50

Oral Session 8

Chair: Cheil Moon

Light regulates immunity via a direct retina-to-lymph node pathway

Francesco De Virgiliis, University of Geneva, Geneva, Switzerland, Long-Term Fellowship 2022

Towards biological communication with light

Matjaž Humar, Faculty of Mathematics and Physics, University of Ljubljana, Ljubljana, Slovenia, Research Grant – Program 2020

Modelling cortico-limbic system in vitro to study human neurodevelopment and disease

Maria Giovanna Garone, Murdoch Children's Research Institute, Parkville, Australia, Long-Term Fellowship 2022

Gears: a toolkit for visualizing and manipulating endogenous protein function

Caroline Hoppe, Yale University, New Haven, United States of America, Long-Term Fellowship 2022

11:50–12:20

Poster Talk 3

Chair: Phil Hodgkin

Fanzor is a eukaryotic programmable rna-guided endonuclease
Makoto Saito, Broad Institute | Stanley Building, Cambridge, United States of America, Long-Term Fellowship 2020

Using electron cryotomography to understand actinobacterial membranes
Rory Hennell James, University Medical Center Hamburg-Eppendorf, Hamburg, Germany, Long-Term Fellowship 2022

Deriving jerboa induced pluripotent stem cells to unravel the mechanisms of limb-size control via inter-species chimeras
Isha Goel, Cambridge University, Cambridge, United Kingdom, Long-Term Fellowship 2023

Mapping the biosynthesis of bmp, a key phospholipid enabling lipid degradation in the lysosomes
Shubham Singh, MSKCC, New York, United States of America, Long-Term Fellowship 2022

Whole-brain network analysis for neuronal representation of imprinted courtship cues
Serena Bovetti, University of Turin, Torino, Italy, Research Grant – Program 2020

Exploring morpho-functional relationships in cephalopod beaks: insights from experimental and computational analysis
Louise Souquet, University College London, London, United Kingdom, Long-Term Fellowship 2021

A conserved fertilization complex bridges sperm and egg in vertebrates
Victoria Deneke, Research Institute of Molecular Pathology (IMP), Wien, Austria, Long-Term Fellowship 2020

Dancing molecules with sub-nanometer steps
Duhan Toparlak, University of Oxford, Oxford, United Kingdom, Long-Term Fellowship 2022

12:20–13:30

Lunch Break

13:30–15:30

Oral Session 9

Chair: Barbara Pauly

Optimizing base editing for high-throughput enhancer mutagenesis in vivo
Julia Falo Sanjuan, University of California, Berkeley, Berkeley, United States of America, Long-Term Fellowship 2021

Maintenance, homeostasis and heredity of mitochondria and their genomes
Suliana Manley, Swiss Federal Institute of Technology Lausanne, Lausanne, Switzerland, Research Grant – Program 2021

Hidden comet-tails of marine snow impede ocean-based carbon sequestration
Rahul Chajwa, Stanford University, Stanford, United States of America, Cross-disciplinary Fellowship 2021

Transcriptional priming facilitates the pole cell to germ cell transition during drosophila embryogenesis
Arjuna Rajakumar, Whitehead Institute for Biomedical Research, Cambridge, United States of America, Long-Term Fellowship 2022

Signal-dependent regulation of nf-kb activity
Dimitris Thanos, Biomedical Research Foundation Academy Of Athens, Athens, Greece, Research Grant 2001

How do social animals use vocal communication to coordinate group behaviors?
Ariana Strandburg-Peshkin, University of Konstanz, Konstanz, Germany, Research Grant – Program 2019

15:30–18:00

Poster Session

Venue: Poster Area at JW Marriot Hotel

19:00–22:00

Conference Dinner Reception

Venue: Smithsonian American Art Museum (Entry F Street)
Great Hall and Kogot Courtyard in the Smithsonian American Art Museum including access to the museum exhibits

Poster List

1. The ribosome lowers the entropic barrier of protein folding

John Christodoulou, University College London, London, United Kingdom, Young Investigator Grant 2007

2. Fanzor is a eukaryotic programmable rna-guided endonuclease

Makoto Saito, Broad Institute | Stanley Building, Cambridge, United States of America, Long-Term Fellowship 2020

3. Using electron cryotomography to understand actinobacterial membranes

Rory Hennell James, University Medical Center Hamburg-Eppendorf, Hamburg, Germany, Long-Term Fellowship 2022

4. A comprehensive mathematical framework for computational biology: dynamical graph grammars for cytoskeleton in plant cells and in synapses

Eric Mjolsness, University of California, Irvine, Irvine, United States of America, Research Grant 2018

5. Deriving jerboa induced pluripotent stem cells to unravel the mechanisms of limb-size control via inter-species chimeras

Isha Goel, Cambridge University, Cambridge, United Kingdom, Long-Term Fellowship 2023

6. Rock-paper-scissors dynamics between mobile genetic elements

Jana S. Huisman, Massachusetts Institute of Technology, Cambridge, United States of America, Long-Term Fellowship 2023

7. Mapping structural and functional connectivity of the distributed sensory system in chiton armor

Ling Li, University of Pennsylvania, Philadelphia, United States of America, Research Grant – Program 2023

8. Highly parallel and programmable single-molecule force spectroscopy by light-guided patterning

Hansol Choi, Boston Childrens Hospital, Boston, United States of America, Cross-disciplinary Fellowship 2023

9. OPRF impacts pseudomonas aeruginosa biofilm matrix edna levels in a nutrient-dependent manner

Boo Shan Tseng, University of Nevada, Las Vegas, Las Vegas, United States of America, Research Grant – Early Career (formerly Young Investigator Grant) 2021

10. Mapping the biosynthesis of bmp, a key phospholipid enabling lipid degradation in the lysosomes

Shubham Singh, MSKCC, New York, United States of America, Long-Term Fellowship 2022

11. Ant aggregation pheromones: from social behavior to neural coding

Matteo Rossi, The Rockefeller University, New York, United States of America, Long-Term Fellowship 2023

- 12.** Robust folding of the expanding pupal wing under confinement
Soichi Hirokawa, IBDM (Institute of Developmental Biology of Marseilles), Marseille, France
Long-Term Fellowship 2023
- 13.** Understanding the metabolic function of endoplasmic reticulum in physiology and disease
Shanshan Liu, The Rockefeller University, New York, United States of America, Long-Term Fellowship 2023
- 14.** Exploring neural crest cell dynamics in newt limb regeneration
Miyuki Suzuki, California Institute of Technology, Pasadena, United States of America, Long-Term Fellowship 2022
- 15.** Cell-state specific remodeling of the malate aspartate shuttle
Julia Stefanie Brunner, Memorial Sloan-Kettering Cancer Center, New York, United States of America, Long-Term Fellowship 2021
- 16.** The pyruvate dehydrogenase complex regulates mitochondrial matrix protein phosphorylation and mitophagic selectivity, independent of its catalytic activity
Hagai Abeliovich, The Hebrew University of Jerusalem, Jerusalem, Israel
- 17.** A phenopushing platform to identify compounds that fast-track cellular adaptation to hypoxia
Li Li, University of California San Francisco, San Francisco, United States of America, Cross-disciplinary Fellowship 2020
- 18.** Regulation of cell identity and identity breakers
Amir Orián, Technion - Israel Institute of Technology, Haifa, Israel, Career Development Award 2005
- 19.** Charting the origin, diversity and biogeography of small proteins in the global ocean microbiome
Samuel Miravet Verde, ETH Zürich, Zürich, Switzerland, Long-Term Fellowship 2023
- 20.** A high-throughput screen for the identification of nucleolar localisation sequences in ribosomal proteins
Katrina Meyer, Max-Planck-Institut für molekulare Genetik, Berlin, Germany, Long-Term Fellowship 2020
- 21.** The heart adapts to viral infection in one of three ways
Cameron Griffiths, University of Virginia, Charlottesville, United States of America, Long-Term Fellowship 2021
- 22.** It takes two to tango—unraveling trophic interactions in the phycosphere
Alejandro Martínez-Calvo, Princeton University, Princeton, United States of America, Cross-disciplinary Fellowship 2021
- 23.** The regulation of social conflict in the Indian jumping ant (*harpegnathos saltator*)
Ching-Han Lee, New York University, New York, United States of America, Long-Term Fellowship 2023

- 24.** Telomere length in a South African population co-infected with HIV and helminths
Engelinah Macamo, University of KwaZulu-Natal – Nelson R. Mandela School of Medicine, Berea, South Africa
- 25.** Intra and inter-specific variability of mechanical properties in cephalopod beaks
Anastasiia Maliuk, University College London, London, United Kingdom
- 26.** Exploring morpho-functional relationships in cephalopod beaks: insights from experimental and computational analysis
Louise Souquet, University College London, London, United Kingdom, Long-Term Fellowship 2021
- 27.** Paleo-evo-devo: a pilgrimage to the past through understanding the present
Shuo Wang, East China Normal University, Shanghai, China, Cross-disciplinary Fellowship 2018
- 38.** Coevolution of body morphology, neural circuits, and behavior
Jasper Phelps, Swiss Federal Institute of Technology Lausanne, Lausanne, Switzerland
Long-Term Fellowship 2023
- 29.** Early replacement of somatic cell linker histones causes global chromatin decompaction at initiation stage of iPSC reprogramming
Jingchao Zhang, University of Pennsylvania, Philadelphia, United States of America, Long-Term Fellowship 2019
- 30.** The role of host-odor sensing in the evolution of mosquito vector competency: a friend or a foe
Tina Mukherjee, Institute For Stem Cell Science and Regenerative Medicine, Bengaluru, India, Research Grant – Program 2023
- 31.** Widespread electrical plugs that turbocharge nanowires of electric bacteria to power nature's electric grid: diverse species can use a single protein family to inject electrons into cytochrome filament to export electrons to extracellular acceptors
Carlos Salgueiro, NOVA School of Science and Technology (FCT NOVA), Caparica, Portugal, Research Grant – Program 2024
- 32.** Single-cell imaging of extracellular electron transfer correlated with genetic, biochemical, structural and computational results reveals the identity of nanowires on common soil bacteria
Nikhil Malvankar, Yale University, New Haven, United States of America, Research Grant – Program 2024
- 33.** Disentangling microbiome effects on plant development
Alejandra Hernandez Teran, University of California, Irvine, Irvine, United States of America, Long-Term Fellowship 2023
- 34.** A conserved fertilization complex bridges sperm and egg in vertebrates
Victoria Deneke, Research Institute of Molecular Pathology (IMP), Wien, Austria, Long-Term Fellowship 2020

- 35.** Molecular mechanism of phenotypic memory for bacterial growth in fluctuating environments
Edo Kussell, New York University, New York, United States of America, Young Investigator Grant 2011
- 36.** Association of HLA class ii alleles in children and young adults with acute rheumatic fever and rheumatic heart disease from Limpopo province, South Africa
Matete Kgasha, Sefako Makgatho Health Sciences University, Pretoria, South Africa, Career Development Award 2023
- 37.** Mechanochemical control of avian gastrulation: theory and experiments
Mattia Serra, University of California San Diego, La Jolla, United States of America, Research Grant – Early Career (formerly Young Investigator Grant) 2024
- 38.** Integrating plant genetics and bee foraging behaviour to understand the co-evolution of plant-pollinator interactions
Jaya Sravanthi Mokkaapati, The Pennsylvania State University, State College, United States of America, Research Grant – Program 2021
- 39.** Probing ultrafast dynamics in artificial light-harvesting systems
Winald Robert Kitzmann, Massachusetts Institute of Technology, Cambridge, United States of America, Cross-disciplinary Fellowship 2024
- 40.** Dancing molecules with sub-nanometer steps
Duhan Toparlak, University of Oxford, Oxford, United Kingdom, Long-Term Fellowship 2022
- 41.** Gene expression profiling of the abomasum of resistant and susceptible dohne merino sheep infected with haemonchus contortus
Tondani Madeleine Ramantswana, ARC-Onderstepoort Veterinary Research, Pretoria, South Africa
- 42.** Controlling macroscale morphology in DNA-based assembly using acoustic energy
Zohar Arnon, Columbia University, New York, United States of America
Cross-disciplinary Fellowship 2021
- 43.** Searching for hypoxia sensors and effectors using a phenotypic profiling platform
Li Li, UCSF, San Francisco, United States of America
Cross-disciplinary Fellowship 2020
- 44.** A quantitative in vitro approach to virus infection
Paul Soudier, University of Minnesota, Minneapolis, United States of America
Long-Term Fellowship 2024
- 45.** Genomic characterisation of acinetobacter baumannii associated with neonatal sepsis in a South African population
Bonginkosi Shabangu, University of the Witwatersrand, Johannesburg, Johannesburg, South Africa,
Young Investigator Grant 2023

46. Inhibiting dengue virus infection: role of 25-hydroxycholesterol in membrane fusion dynamics

Rahul Roy, Indian Institute of Science, Bengaluru, India

Research Grant – Program 2020

47. Spatial transcriptomics defines injury-specific microenvironments in the adult mouse kidney and novel cellular interactions in regeneration and disease

Michal Polonsky, California Institute of Technology, Pasadena, United States of America

Long-Term Fellowship 2019

48. Biosensing of disease environments for rational design of pro-drugs

Itay Algov, Dana-Farber Cancer Institute, Boston, United States of America

Long-Term Fellowship 2023

49. Genealogy vs convergence in evolution of integrative systems: how to make a circuit and a brain?

Leonid Moroz, University of Florida, Gainesville, United States of America

Research Grant 2017

50. Charting the symbiosis seascape: exploring variation in marine microbial symbioses with comparative and population genomics

Roxanne Beinart, University of Rhode Island – Bay Campus, Narragansett, United States of America

Research Grant – Early Career (formerly Young Investigator Grant) 2024