Maor Knafo

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Summary

Molecular biologist and experimental systems builder working at the interface of molecular engineering, quantitative biology, and single-cell decision-making. I develop micro/nanofabricated platforms, high-throughput perturbation assays, and closed-loop experimental systems to study adaptive behavior in unicellular organisms. My work combines synthetic/molecular tools, live-cell measurement, Bayesian inference, information theory, and population-level modeling to understand how cells sense, remember, and learn to respond to changing environments.

Current Employment

Postdoctoral Researcher — 05/25 – present
Institute of Evolutionary Biology (IBE, CSIC–UPF) — Barcelona, Spain
Research program: origins of cognition in unicellular holozoans (*Capsaspora owczarzaki*).

Education

Weizmann Institute of Science — Rehovot, Israel
Ph.D. — 2016 – 2024
Supervisor: Prof. Ziv Reich.
Committee: Prof. Rony Paz; Prof. Yitzhak Pilpel.
Thesis topic: Noise in gene expression as a substrate for novel capabilities.

Weizmann Institute of Science — Rehovot, Israel
M.Sc. — 2013 – 2016
Supervisor: Prof. Yoav Soen.
Thesis topic: Coping with novel stress by de novo re-organization of symbionts.

Hebrew University of Jerusalem — Jerusalem, Israel
B.Sc. — 2010 – 2013

Research Interests

Origins of cognition; single-cell learning and decision-making; evolutionary dynamics; *Capsaspora* biology; controlled micro/nanofabricated environments; pooled perturbation screens; Bayesian and information-theoretic inference for phenotype–fitness relationships.

Awards & Honors

Best Poster Prize — Minimal Cognition conference	2024
Ideas Matter Writing Fellowship	2024
Best Poster Prize — Wellcome Connecting Science: Evolutionary Systems Biology	2022
3rd Place (Poster) — Israel Society of Evolutionary Biology	2022
Feinberg Graduate School Award for Academic Excellence	2019
Outstanding Presentation Award (2nd Place) — Entomological Society of Israel	2015
Dean's List — Faculty of Agriculture, Hebrew University	2013

Publications

[6] **Beyond Diffusion: Bayesian Learning Strategies in Single-Cell Life**
Maor Knafo, Elena Casacuberta, Iñaki Ruiz-Trillo
PRX Life 4, 023025 (2026)

[5] **CoSMIC: A hybrid approach for large-scale, high-resolution microbial profiling of novel niches**
Maor Knafo, Shahar Rezenman, Tal Idan, Michael Elgart, Shlomi Dagan, Vered Zavaro, Ziv Reich, Ruti Kapon, Dagan Sade, Noam Shental
PLOS ONE 21(1):e0340349 (2026). Co-first author

[4] **Variability in Protein Expression and Fitness Under Stress: Distinct Modes of Early Adaptation of Populations**
Maor Knafo, Shahar Rezenman, Reinat Nevo, Ivgeni Tsigalnitski, Ziv Reich, Ruti Kapon
PRX Life 3(1):013006 (2025)

[3] **gUMI-BEAR, a modular, unsupervised population barcoding method to track variants and evolution at high resolution**
Shahar Rezenman, Maor Knafo, Ivgeni Tsigalnitski, Shiri Barad, Ghil Jona, Dikla Levi, Orly Dym, Ziv Reich, Ruti Kapon
PLOS ONE 18(6):e0286696 (2023). Co-first author

[2] **Identification and characterization of the key enzyme in the biosynthesis of the neurotoxin β-ODAP in grass pea**
Moshe Goldsmith, Shiri Barad, Maor Knafo, Alon Savidor, Shifra Ben-Dor, Alexander Brandis, Tevie Mehlman, Yoav Peleg, Shira Albeck, Orly Dym, Efrat Ben-Zeev, Ranjit S. Barbole, Asaph Aharoni, Ziv Reich
Journal of Biological Chemistry 298(5):101806 (2022). Co-first author

[1] **A principle of organization which facilitates broad Lamarckian-like adaptations by improvisation**
Yoav Soen, Maor Knafo, Michael Elgart
Biology Direct 10:68 (2015)

Patents

[2] **gUMI-BEAR (barcoding method)**
Maor Knafo (Co-inventor)
U.S. Patent Application 18/166,263.

[1] **Methods of microbial profiling (CoSMIC)**
Maor Knafo (Co-inventor)
Israeli Patent Application 314064.

Open Source

[1] **Research code & pipelines (selected)**
Maintains analysis code, simulations, and experimental-control tooling on GitHub:
github.com/maorkn

Research Experience

Postdoctoral Researcher 2023 – 2025
Weizmann Institute of Science Rehovot, Israel
Co-led CoSMIC, a hybrid long-read and multi-region amplicon workflow for high-resolution microbial profiling of novel niches; contributed wet-lab validation, benchmarking, and pipeline development; co-inventor on patent 314064.

Ph.D. Researcher 2016 – 2024
Weizmann Institute of Science Rehovot, Israel
Studied stress-induced phenotypic heterogeneity and early adaptation in yeast using microfluidics, single-cell assays (FACS/microscopy), and information-theoretic/Bayesian analysis; co-developed gUMI-BEAR for lineage tracing and variant screening.

Talks & Posters

XXV JBE (Selected oral presentation) Jun 2026
Beyond Diffusion: Basal Cognition as the Evolutionary Scaffold for Collective Resilience
EMBO Evolution and origins of multicellularity across the tree of life (Poster) Oct 2025
Israel Society for Evolutionary Biology (Selected talk) Sep 2024
Israel Society for Microbiology (Selected talk) Sep 2024
Minimal Cognition: Brained or Brainless Biological Intelligence (Poster; Best Poster Prize) Jun 2024
Wellcome Connecting Science: Evolutionary Systems Biology (Poster; Best Poster Prize) Feb 2022

Teaching & Outreach

Teaching
Teaching instructor: "Real-time PCR" lab course (Weizmann Institute) 2018

Mentoring
Davidson Institute "Alpha Program" (high-school mentoring) Multiple years
Mentorship of high-school students for final exams in biology.

Outreach
Led the establishment of the citizen-led science project "Mapping the Israeli plant microbiome".
A series of lectures exposing science and evolution to underprivileged youth.