Tsubasa Sato

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SELECTED RECOGNITIONS/FELLOWSHIPS

2025.03	**Top100 -DOWNLOADED ARTICLES-** Physics Top 8 of 2024 (Scientific Reports, Nature Portfolio)
2024.08	**Advance Research Funding** Leave a Nest Co., Ltd.
2023.03	**Encouragement Award** High School Student Presentation The 64th Annual Meeting of the Japanese Society of Plant Physiologists
2022.12	**Excellence Award** High School Student Presentation 16th Annual Symposium, Kyoto University Unit of Synergetic Studies for Space
2022.11	**Silver Award** High School Student Presentation The 95th Annual Meeting of the Japanese Biochemical Society

EDUCATION

2025.04-	Faculty of Environmental Information, SFC, **Keio University**
2018.04-2024.03	General Course, **Okayama Hakuryō Junior and Senior High School**

POSITIONS HELD

2025.04-Today	**Technical Assistant** **Institute of Science Tokyo** Department of Computational and Systems Biology, Division of Biological Data Science, Medical Research Laboratory, Institute of Integrated Research
2024.04-Today	**Deputy Director** (2025.04-Today) **Head of Space Division** (2024.04-Today) **ADvance Lab** Leave a Nest Co., Ltd.
2025.08	**Intern** **Beijing Juli Weidu Technology Co., Ltd.** (Beijing, China)
2023.03-2025.03	**Research Intern** **Nagoya University** Division of Systems Biology, Graduate School of Medicine
2023.03	**Research Intern** **National Agriculture and Food Research Organization (NARO)** Production Environment Breeding Group, Western Region Agricultural Research Center

TECHNICAL SKILLS

Wet lab: Anaerobic culture, 16S rRNA amplicon library preparation, sealed ecosystem construction, clinostat operation ***Computational:*** R (lme4, phyloseq), Python, QIIME2, BALSAMICO, Common Lisp ***Engineering:*** Blender (3D modeling), 3D printing (FDM), TouchDesigner, custom clinostat design (GYRAVEC) ***Languages:*** Japanese (native), English (working proficiency; presented research at international conferences and engaged in Q&A sessions within own field), Chinese (elementary proficiency)

SIGNIFICANT CONTRIBUTIONS

(Sato T is a +first and/or *corresponding author)

Environmental microbiology: I designed sealed mini-ecosystems ("Ecosphere" and "Biosealed") to test plant–microbe interactions in simulated extraterrestrial soils. Through manipulation of water, soil composition, and microbial inoculation, I showed that groundwater layers are critical for sustaining plant growth in sealed systems and that microbial introduction enables germination in lunar regolith, Ryugu asteroid, and slag simulants. 16S rRNA sequencing, basic statistical testing in R, and Bayesian compositional modeling (BALSAMICO) revealed plant–Cyanobacteria symbioses maintaining oxygen supply and confirmed that animal life (*Drosophila*) could survive in these closed systems (***Scientific Reports*** 2024*; Top 8 Downloaded in Physics, Nature Portfolio). Additional quantification of effect sizes was performed in Common Lisp. I am now extending this microbial ecology approach to urban environments, using shotgun metagenomics to quantify biodiversity shifts from goat introduction in residential microhabitats (with Keio IAB, Urban Microbiome Group, 2025–present).

Low-gravity biology: <COMING SOON>

Sustainable habitation design: <COMING SOON> Separately, I conducted a longitudinal survey of cooperative culture formation across four university dormitories, applying linear mixed-effects models in R (lme4). Results indicated that spatial configuration explained more variance in residents' cooperative attitudes than gender composition did. I am exploring whether these findings may inform spatial design principles for crew habitats in long-duration missions (***SocArXiv*** Preprint 2026*). Related work

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includes *Technetope*, a media art installation employing network-based data visualization built with Python and TouchDesigner, currently under development with collaborators at University of Tsukuba and Keio University.

PUBLICATIONS

+Equal contribution. *(Co-)corresponding authors. TS is **bolded and double-underlined**.

Preprints and manuscript in press or in revision

2- **Sato T**, Negoro N, LoPresti MN & Iio M (2026) Residential Configuration and Dormitory Culture Formation: A Quantitative Analysis of How Gender Composition and Spatial Design Influence Residents' Cooperative Attitudes in University Housing. https://osf.io/preprints/socarxiv/t3nbf_v1

Peer-reviewed articles

1- **Sato T**, Abe K, Koseki J, Seto M, Yokoyama J, Akashi T, Terada M, Kadowaki K, Yoshida S, Yamashiki YA & Shimamura T (2024) Survivability and life support in sealed mini-ecosystems with simulated planetary soils.
Scientific Reports 14, 26322

CONFERENCE PRESENTATIONS

5- *Oral presentation*, Keio University–HEM Farma Research Exchange, December 2025 (Korea)
4- *Oral presentation*, 7th Moon Village Association Global Workshop & Symposium, December 2023 (Japan)
3- *Poster presentation*, The 64th Annual Meeting of the Japanese Society of Plant Physiologists, March 2023 (Miyagi, Japan) **(Encouragement Award)**
2- *Poster presentation*, 16th Annual Symposium, Kyoto University Unit of Synergetic Studies for Space, December 2022 (Kyoto, Japan) **(Excellence Award)**
1- *Oral presentation,* The 95th Annual Meeting of the Japanese Biochemical Society, November 2022 (Aichi, Japan) **(Silver Award)**

PROFESSIONAL MEMBERSHIPS

4- *Student Member*, The Japanese Biochemical Society (2026–present)
3- *Student Member*, Japanese Society for Space Biology (2025–present)
2- *Student Member*, The Molecular Biology Society of Japan (2025–present)
1- *Student Member*, Japanese Society for Gut Microbiota Research (2025–present)

Outreach Activities

6- *Reviewer*, *Kodomo no Kagaku* “Challenge for Kids” Competition 2026
5- *Speaker,* Leave a Nest × LINOA Innovation Program 2025, 2025, (Tokyo, Japan)
4- *Invited speaker*, Knowledge Manufacturing Leaders X (KMLx) 2025, May 17, 2025, (Tokyo, Japan)
3- *Speaker*, Kyocera × ADvance Lab Innovation Program 2025, 2025, (Kanagawa, Japan)
2- *Invited speaker*, Knowledge Manufacturing Leaders X (KMLx) 2024, June 14, 2024, (Tokyo, Japan)
1- *Invited speaker*, Roundtable Discussion for Kansai Electric Power Company, 2024, (Osaka, Japan)

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