2025 年度活動報告書

EXTREME BIOLOGIES

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Overview

Extreme Biologies is an experimental art project that explores the entangled relationship between biotechnology and cultural values, and their combined influence on the evolution of life. Through a practice-based and interdisciplinary approach that integrates biology, astrobiology, art, and philosophy, the project works with extremotolerant organisms to explore biological adaptation, resilience and the limits of life under extreme conditions. Positioned within the conceptual discourse of the Anthropocene, the project further considers how media art practices can critically engage with ecological crises such as climate change, biodiversity loss, environmental pollution, and the accelerating transformation of Earth's environments.

Research on adaptation, survival, and biological resilience

The second year of the project revolved around a series of laboratory-based artistic experiments with extremotolerant organisms—life forms capable of enduring conditions traditionally deemed incompatible with life. Through work with tardigrades, rotifers, and moss as both biological entities and artistic media, the project investigated alternative perspectives on adaptation, survival, and biological resilience. By engaging with these forms of life, the project also explored how experimental artistic practices can operate as sites of knowledge production, opening critical perspectives on biotechnology and planetary futures.

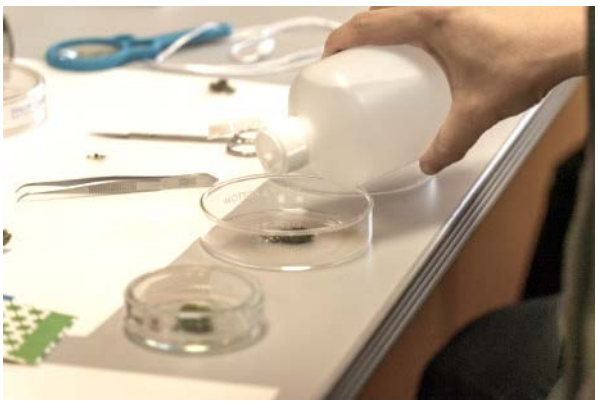
The project unfolded through a sequence of structured phases that combined research, collaborative experimentation, artistic production, and the dissemination of findings. This framework facilitated a dynamic interplay between theoretical investigation and practice-based exploration. Central to the project was a series of lectures and group discussions designed to cultivate interdisciplinary dialogue and collective reflection. These sessions examined the biological and ecological significance of extremotolerant organisms while situating them within broader debates concerning biotechnology, ethics, and cultural values.

By engaging with these topics from multiple disciplinary perspectives, students were encouraged to critically interrogate the cultural narratives and technological assumptions that shape contemporary biotechnological research and our understanding of the living. The lectures and discussions addressed the following themes:

- Life in extreme environments
- The concept of growth and reproduction
- Thinking about extraterrestrial life from the novel and movie "Solaris"
- Art in collaboration with animals and animal rights
- The representation of tardigrades in science and popular culture
- Moss and biological resilience

Fieldwork to collect moss and microorganisms

We explored and gathered several kinds of moss known to support active communities of extremotolerant microorganisms. Our initial fieldwork took place in the area surrounding Softopia Japan in the city of Ogaki. We concentrated on moss species where water bears and rotifers are commonly observed. In particular, we studied *Leucobryum glaucum* often called white hair moss. It stands out for its pale color and rounded, cushion-like shape, which gives it a soft appearance. These mosses retain moisture, offer protection from environmental stress, and trap organic particles, all of which help sustain tardigrades and other microscopic invertebrates.



Top: fieldwork to collect moss and microorganisms around Softopia Japan, Ogaki city. Left: Moss growing on concrete. Right: Working with moss samples at the laboratory.

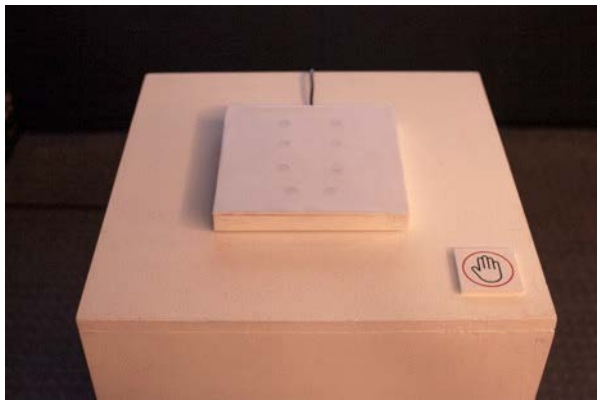
Experimental insights into the resilience of tardigrades

We performed a series of experiments on tardigrades to better understand the factors that contribute to their extraordinary survival abilities. With the help of high-powered microscopes, we examined their physical structure and closely monitored their behavior and responses. Our focus was cryptobiosis, the extraordinary ability that allows tardigrades to enter a suspended state of existence between life and death. In the laboratory, we tested how they respond to extreme conditions such as dehydration and low temperatures. When in cryptobiosis, tardigrades drastically reduce their metabolic activity and can survive environments that would be fatal to most organisms. Once favorable conditions return, they gradually resume normal function. These observations deepened our understanding of how life can adapt to severe stress and highlighted the biological mechanisms that support resilience in extreme habitats.

Top: Image of a tardigrade (hypsibius dujardini) under the microscope. Left: Preparing samples for microscopic observation. Right: Studying the behavior of tardigrades

Exhibition of research activities at IAMAS OPEN HOUSE

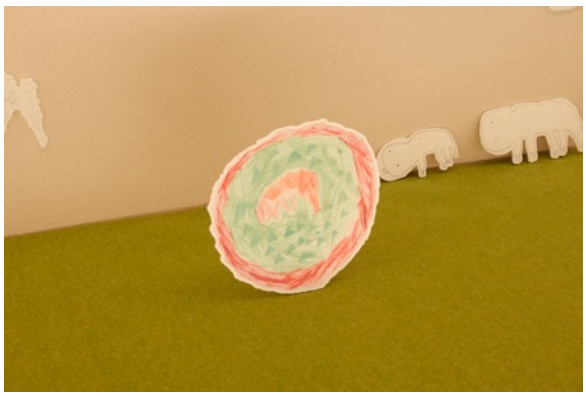
In July, we hosted an exhibition at IAMAS Open House 2025 to present the research activities of our project. Throughout the event, visitors were invited to discover our work and speak directly with students about their methods, findings, and ongoing experiments. They introduced the first outcomes of their studies by displaying early-stage prototypes and explaining how they were developed.
We also organized an interactive workshop where participants tasted and drank chlorella juice to gain a sense of the environment in which tardigrades live and feed. At the same time, guests were able to observe live tardigrades under a microscope as they consumed chlorella in real time, providing a detailed look at their behavior and feeding habits.



Top: General view of the exhibition of the Extreme Biologies project at IAMAS Open House.
Below: Images of the prototypes proposed by the students.

Bio art workshop at Suitopia

We organized and led a bio art workshop for children at the Suitopia Center on September 21st and 23rd. During this workshop, the children collected moss from the area surrounding the Suitopia Center and later examined their samples under microscopes, searching for tardigrades and other microorganisms. They observed their findings closely, shared their thoughts, and created detailed drawings of the tiny creatures they encountered.



Top: Visual documentation of the workshop during the “Extreme Biologies” exhibition at the Suitopia Center. Below: a collection of drawings and figures created by the participants.

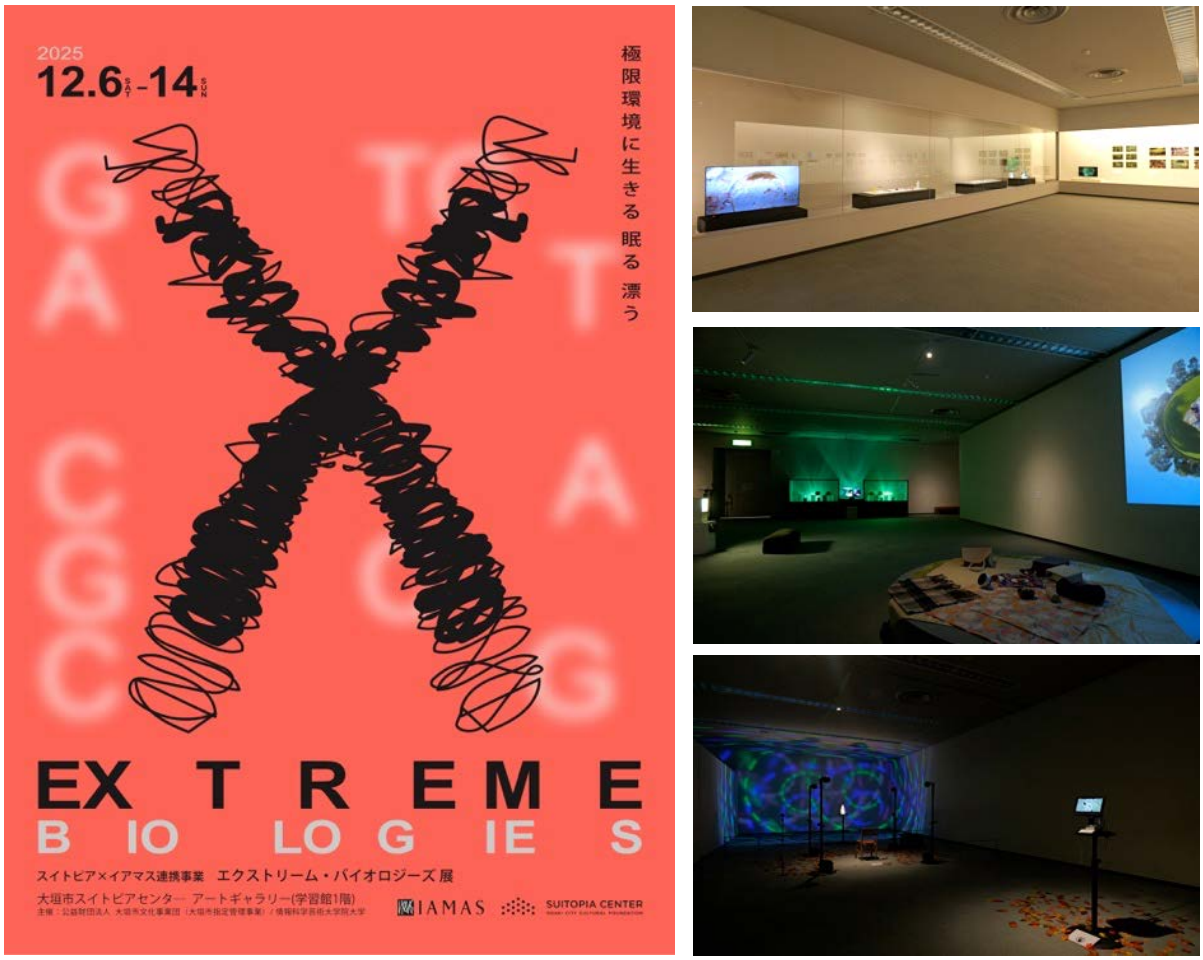
Fieldwork at the Saihoji and Gioji temples

We observed, documented, and compared a wide range of mosses at Saihoji and Gioji temples in Kyoto. More than 120 varieties now grow in the garden of Saihoji Temple alone. The ground is almost entirely blanketed in moss, forming a green, carpet-like landscape. One of the most recognizable species there is *Leucobryum glaucum*.
The Saihoji garden was not carefully designed in the way many traditional Japanese gardens are. It emerged over time, shaped by periods of war, neglect, and the quiet persistence of plant life. Rather than reflecting a single aesthetic plan, this landscape reveals how nature responds to change. During our fieldwork, we examined how mosses reproduce by releasing spores, looked at their relationship with microscopic tardigrades that live among them, and considered what mosses can teach us about survival and resilience.

Top: fieldwork at the moss garden in the Saihoji temple. Left: Searching and studying different types of mosses in the moss garden. Right: Image of the “moss flowers” with spores.

“Extreme Biologies” Exhibition

“Extreme Biologies – Living, sleeping, and drifting in extreme environments”, a collaborative exhibition by IAMAS and Suitopia, was held at the Art Gallery of the Suitopia Center in Ogaki City from December 6 to 14, 2025. The exhibition highlighted our ongoing project activities, research on extremotolerant organisms, documentation of workshops, and a series of artworks developed through the project.
This exhibition functioned as a platform for translating the ideas and research developed over the course of two years into tangible forms. Furthermore, the exhibition worked as a site for critical reflection on the Anthropocene and the resilience of life. By integrating artistic production with research on extremotolerant organisms, the works addressed issues such as climate change, pollution, extreme weather, waste, and the conditions of life in extreme environments. In doing so, the exhibition aimed to provoke new perspectives on how life on Earth might evolve radical and unfamiliar forms of adaptation, challenging existing assumptions about what it means to be alive.



Left: Poster the exhibition “Extreme Biologies – Living, sleeping, and drifting in extreme environments”.
Right: General view of the exhibition at the Suitopia Center.