



TOYOTA KONPON RESEARCH INSTITUTE INC.



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ANNUAL REPORT 2023

Clarifying the role of the Toyota Konpon Research Institute in order to continue researching what to research

Three pillars which are our core activities

In July 2023, we changed our corporate name to Toyota Konpon Research Institute. The idea behind this change was to return to our roots. We started afresh as an institute that conducts research to identify significant research direction by pondering on the thoughts we had when we founded it. At the trial period for the new Konpon Research Institute in 2022, we established three pillars to serve as the role of the Institute. Since then, these pillars have become the main axis of our activities.

【The first pillar】
Explore and investigate future research projects

【The second pillar】
Increase interest in science and enhance scientific literacy

【The third pillar】
Develop human resources who can connect with diverse researchers

In order to strengthen and add greater meaning to these pillars, we are continually embracing the challenge of improvement. Beginning in 2022, we have implemented changes aimed at enhancing our efforts in 2023 and beyond.

Designing a logo worthy of starting anew

Our new logo reflects the concept of returning to our roots while embarking on a fresh start. We updated the original designed at the time of founding to match our new activities. The white downward-pointing part represents the pursuit of foundational elements, and the upward spread represents the expansion of research fields and researchers. Furthermore, by making the new logo more vertical than the previous, we highlighted our commitment to deeper exploration in research. We also expressed the appearance of a flower bud opening with a burst. The blue color and gradation represent hope for the future, a premonition of a spark of inspiration, by shining a faint light from below into the depth of the universe, which is the foundation of everything. The center of the logo features the word KONPON, which is the Japanese word for foundation. The red letters TOYOTA indicate that we are an affiliated company of Toyota Motor Corporation.



Moving forward resolutely in a diversifying and changing society Purpose, Vision, Mission, and Value

The Institute follows unchanging guidelines such as the Five Main Principles of Toyoda. However, we took this occasion of starting anew to systematically express our current thoughts. We began with the search for new challenges to constantly improve. As we continue improvements for a long time to come, these actions will always produce changes. This attitude is important for the Toyota Konpon Research Institute to become a place where setbacks are the springboard for renewed efforts. Our activities are also open to academia, fostering collaboration and the joint exploration of new research topics. We encourage researchers from various fields to come together and engage deeply in enthralling research. In this way, we aim to create a space where colleagues can share ideas and continue to link one to another.

Discussions which include everyone

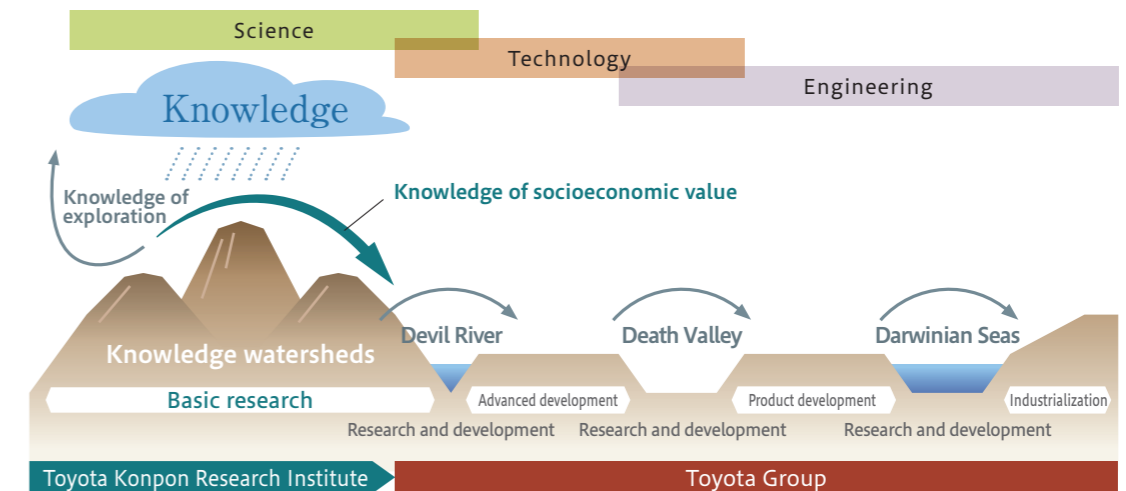
When formulating our purpose, vision, mission, and value, everyone including top management shared opinions and discussed how to express what we were thinking. While holding discussions over a period of about half a year, we obtained agreement on each word. The repeated discussions were a great opportunity for us all to clarify our identity and to work together with a sense of unity. Toyota Konpon Research Institute belongs to all of us, and we insisted on total participation in the decision-making process in order to define our aspirations for the future.

| PURPOSE | Contribute to the happiness and progress of humanity and to the harmony with the Earth and all living things

We are embracing the challenge of an approach that is driven by dreams. This approach encourages each individual to pursue their dreams. No one can foresee what will be useful in the future. Our Institute wants to increase options for the future. We look at things from the perspective of foundational elements and prepare for the unknown. This approach will generate a variety of research direction. We defined our purpose to represent a future with connections to diverse and interesting research, and to illustrate the direction of our progress. "Happiness and progress of humanity" and "harmony with the Earth and all living things" are equally important. Our purpose expresses the desire to work together in order to improve both of these concepts.

| VISION | Fly over "knowledge watersheds"

From the time of conducting trials for the new Konpon Research Institute in 2022, we have strived to create direction that would contribute to realizing the happiness and progress of humanity and the harmony with the Earth and all living things. Furthermore, based on our desire to discover many options beyond the Toyota Group, we took our approach to "flying over knowledge watersheds." As we think of knowledge watersheds as mountains of science, it is only by traversing those mountains that research in Devil River can begin. Our Institute eagers to create projects that will fly over the watersheds.



| MISSION | Research what to research

The mission expresses our origins and our raison d'être. By continually considering the meaning of our existence, we will understand what actions must be taken next.

| VALUE | Think from the perspective of foundational elements, be more open, and enjoy exploring a frontier.

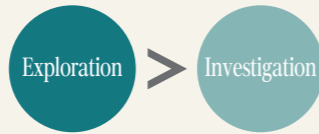
We view our values with great importance. Moreover, we want researchers involved in our Institute to empathize with the values. With that in mind, we defined our values to make Toyota Konpon Research Institute more appealing, beloved worldwide, and to inspire researchers to collaborate here. Our origin is truly to "think from the perspective of foundational elements." "Being more open" reflects expanding our actions by connecting with more associates to enhance our activities. Finally, we want to base our actions on enjoying frontier exploration. Although the majority of research does not proceed as plan, it is essential to enjoy the process and take the next step toward the future. Our Institute is committed to going forward with colleagues who empathize with these three values.

Expanding exploration activities through two distinct approaches

Framework of research project creation

Which mountain should I choose from the mountain range?

Activities that look across the vast mountain range [research field] and discover an unexplored, cutting-edge, and interdisciplinary mountain [research project]



Are there any precious gemstones in that mountain?

Activities to verify, evaluate, review, and determine research projects discovered through exploration

Exploring and investigating research projects require broad insight, deep expertise, and diverse perspectives. There are limits to activities that rely on the abilities of individual researchers. In our exploration, we invite researchers engaged in most advanced research from a variety of fields. Through discussions with these researchers, we work to discover unexplored research projects from many standpoints.

Evolution of Exploration in 2023

We increased the scale of activities for the Exploration Program which we developed in 2022. In 2023, we added Joint proposal of research projects by Toyota Konpon Research Institute research coordinators and academia.

Two distinct approaches to exploring research projects

1 Exploration Program 2023

>> P.04~07

We invite active young researcher from a variety of academic fields to serve as research advisors. Their curiosity leads the creation of research projects.

2 Joint proposal of research projects by research coordinators and academia

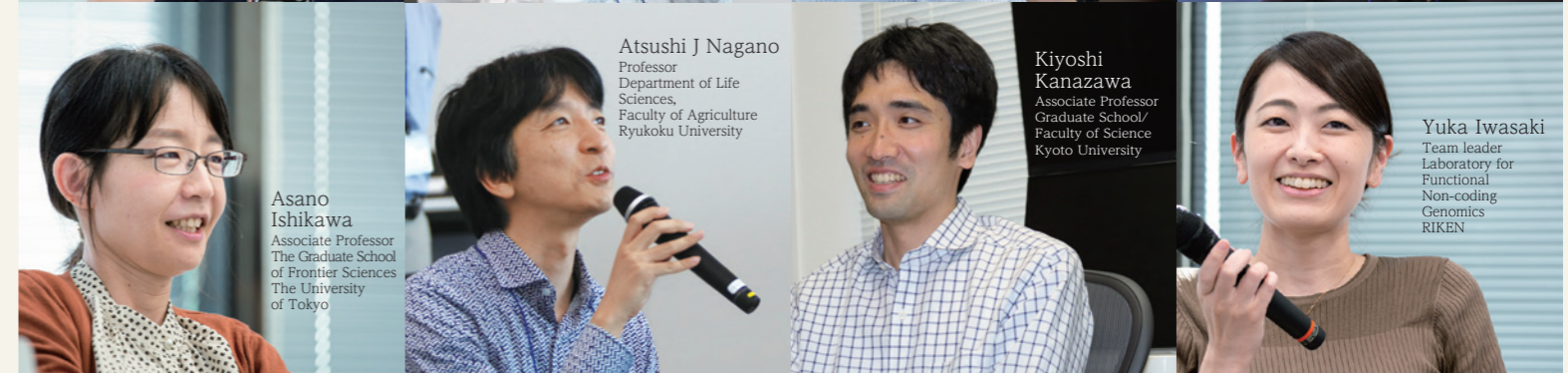
>> P.08

Research coordinators lead in-depth interactions with active academic researchers with the aim of co-creating research projects that are ahead of the times.



Research Advisors 2023

*Information on affiliation and position are provided at the time of appointment as research advisor.



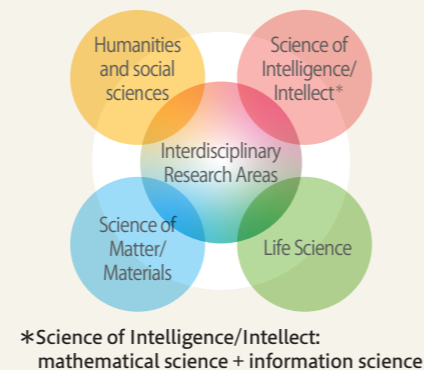
1 Exploration Program 2023

This program launched in 2022 by inviting active academic researchers from various fields to serve as research advisors. Interdisciplinary projects were explored based on cutting-edge research results. In 2023, the program's second year, our activities expanded by broadening the exploration fields and increasing the number of invited researchers. We also enhanced support for participating research advisors and improved both the quality and quantity of program activities.

Evolution in 2023

Larger scope of exploration and more researchers

- It is our goal to comprehensively and fundamentally ascertain matters and explore projects by returning to the roots of things. In 2023, we expanded the scope of our research to four scientific fields by adding humanities and social sciences to the three fields of natural sciences.
- We increased the number of research advisors from 9 to 21, aiming to create a gathering place for researchers with diverse expertise and research.



Support for the child-rearing generation

Many of our research advisors are in the child-rearing generation. In 2022, there were cases in which research advisors ended their discussion and left the workshop early in time to pick up their children from nursery school. Therefore, in 2023, we set up a temporary childcare center next to the workshop venue to support research advisors who are raising children. The laughter of children leads to the happiness of research advisors and creates a cheerful atmosphere. In 2024, in addition to holdings discussions to crystallize and realize investigation projects, we will explore and implement measures necessary for co-creation with everyone in academia.



Feedback from users of childcare services



Even members who are raising children can work with peace of mind

Asano Ishikawa
Associate Professor
The Graduate School of Frontier Sciences
The University of Tokyo

Initially, I was hesitant to participate in the Exploration Program because I don't receive any help from family members in raising my son. However, Toyota Konpon Research Institute assured me that I would receive full support, so I decided to jump into this new work environment. In addition to the childcare center, other members at the Institute are really kind to my son; for example, they always take the time to chat with him and hug him. This makes it easy and enjoyable for me to participate in discussions. Also, it is extremely meaningful to have the opportunity to talk both professionally and privately with other researchers who are raising children.

Approach to projects creation

Researchers gathered from different fields to create interdisciplinary projects. Based on the approach introduced in 2022, we divided the discussion forum into the two steps of "broadening ideas" and "converging," thus creating a total of four steps.

STEP 1	Getting to know each other	Learn about cutting-edge topics in other research fields
STEP 2	Broadening ideas	Ensure psychological safety and enrich ideas
STEP 3	Converging	Converge different ideas and refine topics
STEP 4	Deciding	Decide project based on the appeal of the topic

Results of activities in 2023

21 research advisors participated in the Exploration Program 2023. First, researchers from different fields deepened their mutual understanding through meetups and one-on-ones. Next, the researchers participated in workshops to expand ideas and conceived 17 budding ideas. In the Ideathon, they converged these ideas into five research topics. The final step was a contest in which four new interdisciplinary research topics were selected.

STEP 1

Getting to know each other

Meetups: 14; One-on-ones: 89

21
researchers

This is an opportunity for researchers who do not usually meet to discuss their current research interest and aspirations; for example, research topics which they want to take on in the future. Aiming at identifying seeds for new interdisciplinary research topics based on cutting-edge research results, we set one-on-one meetings for mutual communication in addition to the last year's popular meetups.



Deepening mutual understanding through one-on-one communication



Increasing interaction with research coordinators through social gatherings

STEP 2

Broadening ideas

Workshops: June to August (3 times)

17
ideas

To encourage a creative perspective, it is important to ensure psychological safety, in which any opinion is accepted. In 2023, together with Associate Professor Momo Nakanishi, who is a URA (University Research Administrator) certified by the University of Tokyo, we designed a group work that removes the four anxieties (ignorant, incompetent, intrusive, negative) which undermine psychological safety. This was accomplished by introducing the four key practices of dialogue advocated by William Isaacs (listening, suspending, respecting, and voicing). As a result, researchers conceived a total of 17 budding ideas by August 31.



Holding three workshops to generate a wide range of ideas



Researchers from different fields discussed and broadened ideas

STEP 3

Converging

Workshop: September; Ideathon: October

5
topics

Members empathizing with the 17 ideas generated in the previous step formed teams to define concrete topics. Some ideas received little support and were not developed into research topics. In other cases, multiple topics were fused together to form a common concept. At the Ideathon, researchers discussed the five fused topics and identified requirements to be strengthened according to the Heilmeyer Catechism.



Lively discussion was held on presented topics



Researchers took the initiative to form into teams and present research topics

STEP 4

Deciding

Contest: December

4
projects

Based on the appeal of the research projects developed in the previous step, researchers engaged in peer review to decide which research projects will proceed to the investigation phase. This year's Contest saw proposals for research projects from a wide range of perspectives, including a research project on the global environment.

Selected projects

In addition to the projects selected through peer review by research advisors, projects were also selected by research coordinators. Ultimately, the following four projects were selected. After formulating research plans, researchers will begin investigative research for the selected projects.

① Exploration of universal structures in multi-component, polydisperse systems

③ Designing the future of the Earth's environment

② Artificial Embodied Intelligence

④ Advance into the unexplored “sand” fields

Feedback from research advisors



An opportunity to explore research projects based on curiosity

Asa Ito

Professor, Institute for Liberal Arts, Tokyo Institute of Technology

It is extremely valuable to have the opportunity to explore research projects based on curiosity, without being obsessed with short-term results or practicality. I participated as a humanities researcher, and my ideas always seemed to be interfering with the scientific discussions. However, thanks to the natural science researchers picking up on the keywords in my ideas, I was able to participate in the discussions very comfortably. While participating, I frantically took notes so that I could absorb everything being said.



An exciting opportunity to surpass stereotypes and seize opportunities for building new interdisciplinary fields

Kosuke Fujishima

Associate Professor, Earth-Life Science Institute, Tokyo Institute of Technology

Exploring uncharted ideas with researchers from different fields was more difficult than I imagined; however, it was a very enjoyable experience. For example, at the beginning of discussions, researchers from the fields of biology and engineering had a different understanding of the term “evolution.” Biology researchers understood it as the change in individual organisms due to natural selection, while engineering researchers comprehended it as the change in objects to pursue design according to desired functions. While discussing the term “evolution” with other researchers participating in the program, I realized that the only difference in understanding is whether the selective pressure that drives change comes from nature or from humans. In this way, researchers were able to find common ground in concepts across fields without being bound by stereotypes. This process is essential for seizing opportunities to create new fields. In that respect, this program was a groundbreaking opportunity, and the process of delving into the essence of matters was very stimulating.

Prospects for 2024

- **Creating opportunities for face-to-face meetings: Holding workshops with the participation of all research advisors**

More than twice as many research advisors participated in 2023 as in 2022. Although we increased the number of workshops and opportunities for face-to-face discussions, there was no opportunity for all 21 people to meet face-to-face. We believe that face-to-face communication is essential for creating projects in the Exploration Program. Therefore, we will create an opportunity for everyone to gather for face-to-face discussion and try to quickly build relationships that enable frank communication.

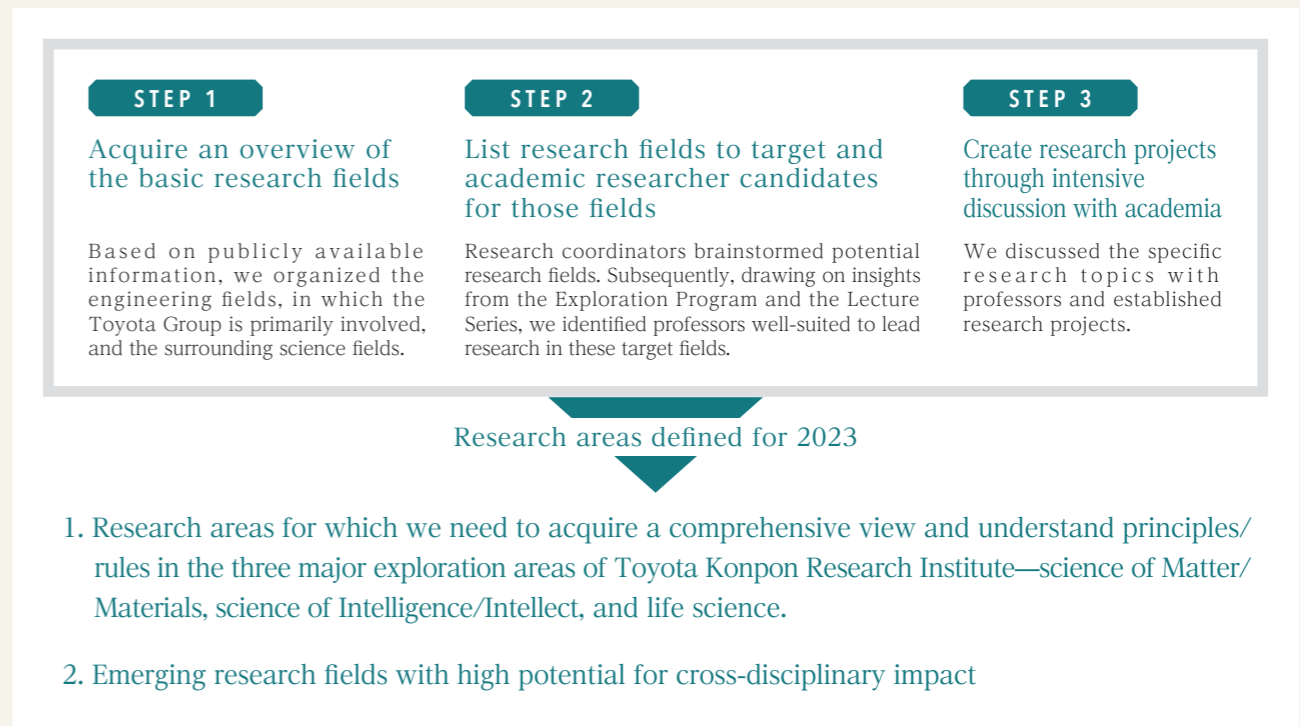
- **Broadening ideas by expanding into the humanities: Adding the arts**

In 2023, we were able to create exploration projects that go beyond natural sciences by expanding into the field of humanities and social sciences. In 2024, we will add the field of the arts, and will aim to explore research projects that are even closer to foundational elements in researching what to research.

2 Joint proposal of research projects by research coordinators and academia

This approach aims to co-create advanced research projects by having research coordinators lead deep interactions with academic researchers.

Approach to creating projects and results of activities



Selected projects

In the two defined research areas, research coordinators held discussions with professors and selected the following projects for each field. The projects were launched as investigative research in 2023.

① Syntheses of iron polyhydrides under extreme conditions

In 2023, we focused on earth and planetary sciences, and set a project exploring material creation in extreme environments.

② Elucidating exosomal trajectory in aging and age-related disease

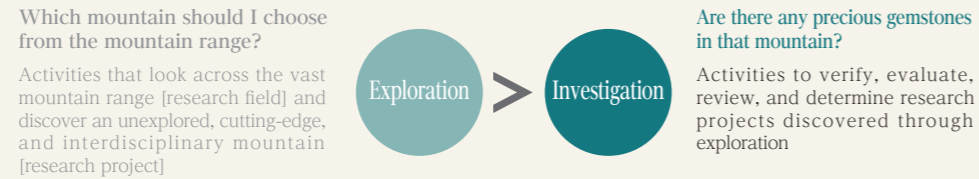
In 2023, we set the project on exosomes, which is a field attracting attention as a new information transmission mechanism in living organisms.

Prospects for 2024

In 2024, we will systematize how to draw an overall picture of the research area and how to define a target field, and will enhance proposal activities by research coordinators.

The true value of a research project is developed through implementation. Agile improvement without being bound by the original research plan.

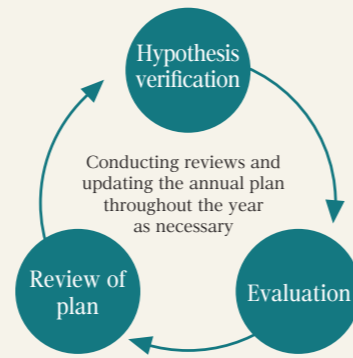
Framework of research project creation



Exploring and investigating research projects require broad insight, deep expertise, and diverse perspectives. In investigation, Toyota Konpon Research Institute commissions research to universities. The commissioned research teams develop the research projects set in exploration while verifying their true value.

How to proceed with investigative research

Many investigative research projects are challenges in unknown and unexplored research fields. Consequently, we can expect situations which do not proceed or differ from initial assumptions. Therefore, it is necessary to agilely review the original plan. Through a continuous cycle of hypothesis verification, evaluation, and refinement, we strive to develop theories and technologies that are not only original but also expandable and universally applicable. By iteratively evolving these concepts, we aim to establish them as the next generation of cutting-edge research projects that will attract a diverse range of researchers.



Investigative research projects launched in 2023

Investigative research projects born from the Exploration Program 2023

Intelligence/Intellect × Life

Principles and Limitation of Frontier Exploration



Convenor
Tetsuya Kobayashi
Professor
Institute of Industrial Science,
The University of Tokyo

Humanities × Life

Multi-Dimensionality of Nonverbal Communication



Convenor
Tomoko Isomura
Associate Professor
Graduate School of Informatics,
Nagoya University

Joint proposal of research projects by research coordinators and academia

Matter/Materials

Syntheses of iron polyhydrides under extreme conditions



Convenor
Kei Hirose
Professor
Graduate School of Science, The University
of Tokyo

Life

Elucidating exosomal trajectory in aging and age-related disease



Convenor
Ayuko Hoshino
Professor
Research Center for Advanced Science and
Technology, The University of Tokyo

Ask Professor Kobayashi

What are exploration and investigation?



Research Advisor 2022/2023
Tetsuya Kobayashi
Professor
Institute of Industrial Science
The University of Tokyo

Unique appeal of interdisciplinary fusion

Opportunities to learn new things

—Professor Kobayashi, you have been involved in the Exploration Program for two years. Why did you decide to participate in this program?

I was motivated to participate in the program due to extremely stimulating experiences in my past. Namely, I had many opportunities to listen to researchers outside my field of expertise since I was affiliated with the Kazuyuki Aihara Laboratory (Graduate School of Frontier Sciences, Department of Mathematical Engineering and Information Physics, Faculty of Engineering, The University of Tokyo) as a JSPS Doctoral Course Research Fellow and since affiliated with the Hiroki Ueda Laboratory (RIKEN Center for Biosystems Dynamics Research, Kobe) as a JSPS Post Doctorate Research Fellow. Based on the experiences, I launched the Japanese Society for Quantitative Biology in 2008 together with professionals from the fields of mathematics and biology. Currently, the society has grown to about 400 members. When I first heard about the Exploration Program, I noticed that its purpose was like that of the Japanese Society for Quantitative Biology, and I decided to participate because I saw the opportunity to learn new things. The academic professionals participating in the Exploration Program are esteemed in their fields and are very active, so the information which we discuss is packed with knowledge and is extremely stimulating. It's truly interesting to be able to discuss important projects in each field of research and to gain new knowledge.

Selecting research fields that are driven by curiosity

—You have experience with many research and development projects run by the Japanese government (hereafter referred to as “national projects”). What do you think is the difference between these national projects and the Exploration Program?

I think researchers are a kind of players. In national projects such as those run by the Japan Science and Technology Agency, the host defines the research field in which to compete, and the researcher (player) makes a proposal to promote that research field. On the other hand, in the Exploration Program of the Toyota Konpon

Research Institute, researchers are required to both define the research field and make a proposal of promotion. They are also required to generate a research project to be driven by curiosity. This gave me an opportunity to think for myself about what I should research going forward, rather than being confined to a set research field.

The perspective of planning research is something that I didn't pay attention to before participating

—Has participating in the Exploration Program caused you to change as a researcher?

In addition to improving my perspective as a player, the need to look beyond my field of expertise when defining a research field has definitely increased my sensitivity to planning research. I was a member of the first group of researchers who participated in the inaugural year of the Exploration Program, so the opportunity to cooperate with research coordinators in the management and planning of the program itself was a significant factor in my personal growth.

Utilizing experience from the Exploration Program in the investigative research

In order to advance investigative research, we held two workshops featuring lectures by researchers from fields such as ecology, neurology, and cell biology. In 2024, we plan to hold workshops with researchers in mathematical information systems. I never would have thought of holding workshops to this extent in investigative research if I did not have the experience of participating in the Exploration Program and working as a research advisor.



Providing opportunities to experience a bird's-eye view of science and gain new, broader, and higher perspectives

Toyota Konpon Research Institute aims to create projects that fly over knowledge watersheds. These projects are expected to be future cutting-edge research at Toyota Group companies. At the same time, it is essential that the recipients have an interest in fundamental science—in other words, high scientific literacy. Based on this idea, the Toyota Konpon Research Institute Lecture Series launched in 2022.

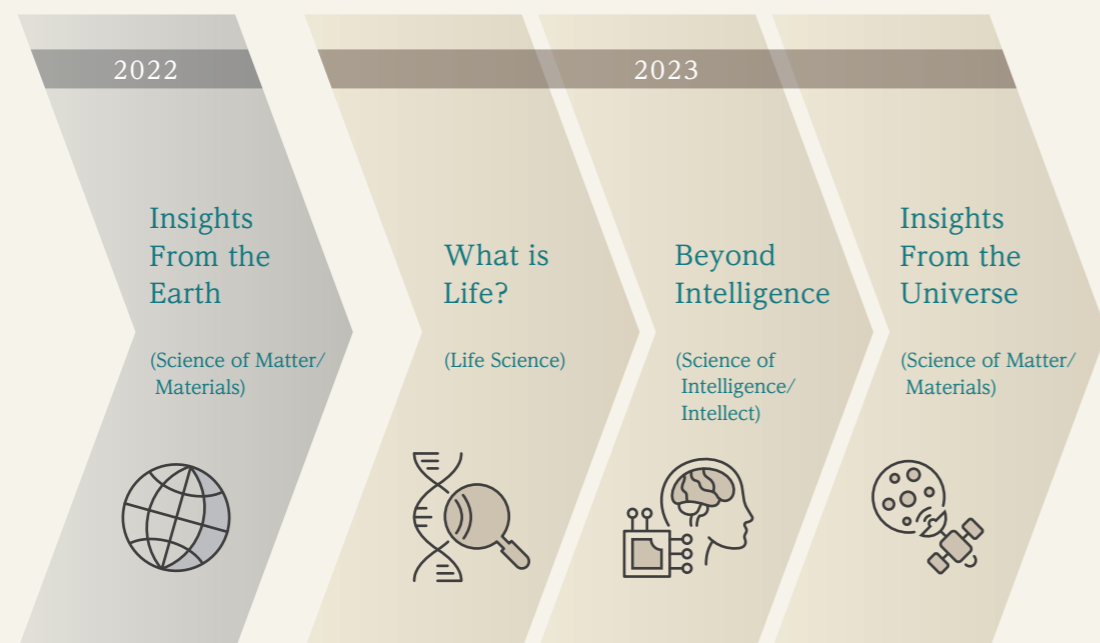
The lecture series will cover the fields of science of matter/materials, science of intelligence/intellect, and life science. Instead of narrow and specialized content that targets a specific field, the lectures will focus on taking a comprehensive view and considering matters over a long period of time. The common theme is “where do we come from and where are we going?” Through the lectures, we hope that a wide range of audience will gain broader horizons as well as new and higher perspectives.

Overview of activities

In 2022, a three-part lecture series was held on science of matter/materials. The series was entitled “Insights from the Earth: Where Do We Come From and Where Are We Going?” (Professor Kei Hirose, The University of Tokyo). Due to the positive reception of the lecture series, we expanded to hold three-field series (life science, science of intelligence/intellect, and science of matter/materials) in 2023, for a total of nine lectures.

As COVID-19 subsided, we increased the number of on-site participants and held group discussions after the lectures, while maintaining a hybrid lecture format. This was an excellent opportunity for participants to deepen their understanding through discussions with the lecturers and to share their awareness of issues among themselves.

Where Do We Come From and Where Are We Going?



What is Life?

Series I [Life Science]

Learning about life through the origin of life, evolution, and AI

Session 1

“What is Life?”
Kaoru Takeuchi
Science Journalist



Session 2

“Why do we have a lifespan?”
Takehiko Kobayashi
Professor
Institute for Quantitative Biosciences
The University of Tokyo

Session 3

“Human Brain and AI”
Yuji Ikegaya
Professor
Graduate School of Pharmaceutical Sciences
The University of Tokyo



ChatGPT and other generative AI are changing the world. As AI develops, people are asking again what life is. Dr. Takeuchi's lecture taught us about the origin and evolution of life. We learned that creating a new system requires a lot of time and energy. Prof. Kobayashi's lecture taught us that death is the end for an individual, but for the evolution of a species, it is the beginning. Prof. Ikegaya asked us what “human nature” is through the contrast between the brain and AI. In this series, we looked at life from many different angles and tried to understand the essence of life science, which is the core of “monozukuri” (manufacturing).

Session 1 : May 19, 2023 Participants: 747
Session 2 : June 28, 2023 Participants: 949
Session 3 : July 19, 2023 Participants: 992

Beyond Intelligence

Series II [Science of Intelligence/Intellect]

Considering the nature of intelligence and intellect for ultimate happiness

Session 1

“Future AI envisioned by Junichi Tsujii—Toward AI in Japan”
Junichi Tsujii
AIST Fellow, National Institute of Advanced Industrial Science and Technology
Professor, The University of Manchester
(cosponsored by the Toyota Physical and Chemical Research Institute)



Session 2

“Future AI envisioned by Youichiro Miyake—Future AI and Philosophy”
Youichiro Miyake
Project Professor, Institute of Industrial Science,
The University of Tokyo



Session 3

“Future AI envisioned by Daisuke Okanohara—AI Science, Engineering, and Business”
Daisuke Okanohara
Representative Director & Chief Executive Researcher
Preferred Networks Inc.



In the past 50 years, human knowledge has been converted into data. But we haven't yet implemented intellect, which is the ability to find answers to questions with no right answer, or wisdom, which cannot be expressed in formal knowledge. How should humans and AI coexist? Prof. Tsujii's lecture focused on the reliability of AI, Prof. Miyake's on the acceptability of AI, and Dr. Okanohara's on the usability of AI, and approached the question of what the ultimate “happiness” of humans is.

Session 1 : September 20, 2023 Participants: 1,053
Session 2 : October 11, 2023 Participants: 999
Session 3 : November 29, 2023 Participants: 830

Insights from the Universe

We in the universe, we seen from the universe,
we born from the universe

Session 1
“Decoding Earth's climate and weather from solar activity”

Hiroko Miyahara
Professor, Musashino Art University



Session 2
“Earth observation from the Universe”

Riko Oki
Director of Earth Observation Research Center, Japan Aerospace Exploration Agency (JAXA)



Session 3
“Origin of elements, stars, and the Universe”

Hitoshi Murayama
Professor, University of California, Berkeley
Professor, Kavli Institute for the Physics and Mathematics of the Universe (IPMU), The University of Tokyo



In FY2022, we looked at climate change, resources, and materials from the perspective of the Earth system under our feet. In FY2023, we further expanded our perspective to the universe, pursuing the fundamentals of the environment and materials around us. Prof. Miyahara's lecture discussed how the sun affects the Earth's climate and weather. Dr. Oki's lecture outlined the present and future of the Earth using data from satellites. Prof. Murayama's lecture explored the origin of matter (where do we come from?) using the cutting edge of particle physics and astrophysics.

Session 1 : January 25, 2024 Participants: 786
Session 2 : February 16, 2024 Participants: 717
Session 3 : March 22, 2024 Participants: 970

Participant's Voice



On-site participants (executive officer)

The lectures on the science of life, intelligence/intellect, and matter/materials addressed their origins and foundations, thereby improving my science literacy. Much of the lecture content was related to the evolution of humankind. Recognizing the fine line between AI exploration and human research, one of our fields, I was able to gain foresight into the future of co-evolution of extraordinary intelligence. Moreover, regarding the lecture on science of intelligence/intellect, we held a panel discussion with representatives from different companies at our R&D exhibition. I feel that knowing the intention behind the selection of lecturers in advance allowed us to understand the lecture more deeply and to take our learning to another level.



Group discussion after the lecture



Online participants (section manager)

I was deeply impressed by the lecture entitled “Why do we have a lifespan?” The act of dying allows us to entrust the process of evolution to the next generation. I learned the awareness of life's impermanence can free us from the fear of change and instill a sense of moving forward. Also, in the lecture on the science of intelligence/intellect, I learned the inherent closeness of AI and philosophy, which at first glance seem to be contradictory, and I was able to experience the depth of thought.



Online participants (general)

Last year, I realized that I didn't know much about the Earth, despite it being the basis of human life. In this year's series entitled “Insights from the Universe,” I was surprised by the theory that the causes of global warming need to be considered not only from perspectives of Earth but also from the sun and other parts of space. This theory illustrated the depth and difficulty of this field of study. By attending the lecture series, I realized the importance of looking at matters from multiple viewpoints and taking the time to consider the essence of things.

Prospects for 2024

In 2023, we focused on broadening the scope of the lectures by inviting three speakers for each series, for a total of nine speakers. In 2024, we will flexibly change the format and conduct a closer examination of the essence of science of matter/materials, intelligence/intellect and life science.

In-depth exploration of lecture topics in books/translations

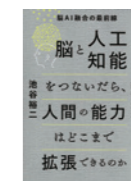
Life science



What is life?
Diamond, Inc.
Paul M. Nurse (Author),
Kaoru Takeuchi (Translator)
2021

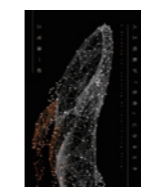


Why do living creatures die?
Kodansha Gendai Shinsho
Takehiko Kobayashi
(Author)
2021



How Far Can Human Capabilities Be Expanded If We Connect the Brain and Artificial Intelligence?
KODANSHA
Daichi Konno (Author),
Yuji Ikegaya (Author)
2021

Science of Intelligence/Intellect



When Artificial Intelligence Becomes 'Life'
PLANETS wakusei2nd
Youichiro Miyake (Author)
2020



The Forefront of AI Technology: 73 Advanced Technologies for Reading Future AI
Nikkei BP
Daisuke Okanohara
(Author)
2022



Is Large Language Model a New Intelligence? ChatGPT changed the world
Iwanami Science Library
Daisuke Okanohara (Author)
2023

Science of Matter/Materials



How Much Can Space Elucidate Earth's Changes? Decoding the Past, Present, and Future of Earth through Solar Activity
KAGAKUDOJIN
Hiroko Miyahara (Author)
2014



What is the Universe Made of?
GENTOSHA
Hitoshi Murayama
(Author)
2010



Why is the universe so beautiful?
GENTOSHA
Hitoshi Murayama
(Author)
2021



Seminars by top overseas universities

- Princeton University -

October 16, 2023 Midland Hall (Nagoya)

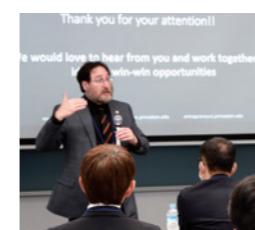


Prof. Craig B. Arnold
Vice Dean for Innovation



Dr. Sacha Patera
Corporate Engagement & Foundation Relations

Toyota Konpon Research Institute has begun activities to “search and explore what to research” from a global perspective by collaborating with top overseas universities through strategic liaison office. In 2023, we invited Prof. Craig B. Arnold and Dr. Sacha Patera from Princeton University. They introduced Princeton's approach to setting research projects. In 2024, we will continue to engage with frontline researchers globally, fostering dialogue and exchange of ideas.



Introducing initiatives at Princeton University



Group discussions after the seminar



Free discussion

Connecting academia from different fields and promoting “researching what to research”

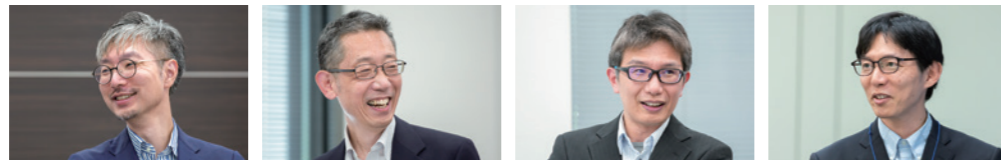
Research coordinators connect with a variety of researchers, including promising academic researchers and well-known researchers. While learning varied and unique ideas and perspectives through dialogue with researchers, coordinators work together to create new knowledge and fly over knowledge watersheds. By collaborating with researchers to “research what to research” in science, coordinators are gaining valuable experience to think, execute, and make improvements on their own initiative. This experience will equip them to lead effective science initiatives within their organizations. In 2023, three new research coordinators joined us to promote the mission of Toyota Konpon Research Institute.

Main activities

- Planning and management of Exploration Program
- Planning and promotion of investigative projects
- Collaboration with overseas universities
- Planning and management of lectures

Introducing research coordinators

Members seconded from Toyota group companies



Tomoya Takatani
Toyota Motor Corporation

Mitsuru Nakano
Toyota Central R&D Labs., Inc.

Yusuke Hongo
Denso Corporation

Masaki Otomori
Aisin Corporation

Members invited from academia



Momo Nakanishi
Associate Professor, Graduate School of Agricultural and Life Sciences, The University of Tokyo
Research coordinator invited from academia for the Exploration Program in 2023. Engaged in planning and management of discussion that ensures psychological safety as well as connecting ideas between Toyota Konpon Research Institute and academia.

Column 01 Introduction of activities in which coordinators fulfil a central role

When I was seconded from Denso in April 2023, not many people at Denso were aware of lectures held by the Toyota Konpon Research Institute to improve science literacy. Actually, few people at Denso even knew about the Institute. To raise awareness toward the Institute’s activities and to increase interest in science, we held a panel discussion at the R&D Exhibition, which is our in-house research introduction event. On the subject of AI research, a topic of great interest at Denso, we looked back on the “science of intelligence/intellect” lecture series by inviting as panelists the key researchers from Toyota Group companies. We also introduced interesting aspects of lectures by Toyota Konpon Research Institute through discussions on each company’s future artificial intelligence.



DENSO R&D Exhibition
Panel Discussion

(Yusuke Hongo)

Column 02 Learning from an academic perspective

It is an invaluable asset to be able to work with researchers who are active at the forefront of a variety of fields. It is extremely stimulating to see how the same phenomenon is often viewed from completely different perspectives by different professors. With the goal of researching what to research by sharing ideas, I will create research projects together with professors while achieving personal growth as a research coordinator. (Masaki Otomori)

Prospects for 2024

It is a pleasure to welcome two new research coordinators to our team. We will accelerate our exploration and investigation together. We are also dedicated to laying the groundwork for the future by fostering global academic collaborations with overseas universities.

Company name	Toyota Konpon Research Institute Inc.
Established	June 11, 1996
Capital JNY	100 million
Location	Nishi-ku, Nagoya City Inside the Toyota Commemorative Museum of Industry and Technology
Representative Director	Takeshi Uchiyamada
President	Noboru Kikuchi
Directors	Tetsuro Toyoda Hiroyuki Wakabayashi Morito Oshita Hirofumi Inoue Hiroyasu Watanabe
Auditors	Hisaaki Takao Hirotaka Takeda
Business details	1. Research, investigation, and provision of technical information regarding future social predictions 2. Research, testing, and investigation of humanities and social sciences, natural sciences, and comprehensive technologies based on those sciences 3. Research, testing, and investigation regarding the development and use of science and technology, and the resulting effects and impacts 4. Research, testing, surveys, and the training and development of researchers and engineers conducted through mutual contracting or jointly with countries, administrative agencies, organizations, and research institutions
Shareholders	Toyota Motor Corporation Toyota Industries Corporation Aisin Corporation Denso Corporation Toyota Central R&D Labs., Inc. Aichi Steel Corporation JTEKT Corporation Toyota Auto Body Co., Ltd. Toyota Tsusho Corporation Toyota Boshoku Corporation Toyota Motor East Japan, Inc. Toyoda Gosei Co., Ltd.
History	June 1996 Established the Genesis Research Institute in the Toyota Commemorative Museum of Industry and Technology in Nishi-ku, Nagoya May 1997 Opened the East Tokyo Laboratory in the Cluster Research Laboratory of the Toyota Technological Institute, Ichikawa City, Chiba Prefecture March 2023 Closed the East Tokyo Laboratory July 2023 Changed the company name to Toyota Konpon Research Institute in an aim to become a research institute where the world’s top diverse researchers gather

Message from the Editor

Thank you for reading our Annual Report 2023. The Toyota Konpon Research Institute has returned to its roots and formulated a new philosophy. We will now step boldly into the future and further expand the scope of our activities. The Institute will continue to deepen our bonds with colleagues who share the same aspirations and work together to research what to research.

