Hokkaido University Times

Hokkaido University's E-Newsletter

October 2018 | Issue 7

Contents

Cover photo:
Gingko Avenue in August

The 2018 Hokkaido Eastern Iburi Earthquake

At 3:08 AM on September 6th, Hokkaido, including Sapporo and Hakodate, was struck by a large earthquake. A few days after, information was distributed for the students and their families regarding health, safety, and school life, and is summarized below.

September 13 | University News

Life at the University
For students who are having difficulty adjusting after the earthquake (not sleeping, no appetite, feelings of fear or anxiety), the university provides counseling services (counseling@oia.hokudai.ac.jp).

The following information is for those students who require support due to suffering caused by the earthquake:

Exemption of tuition fees
For students or their supporters (a person who is responsible for the payment of student's educational expense) who have suffered damage from the Hokkaido Eastern Iburi Earthquake, Hokkaido University will exempt the student's tuition fee based on submission of a Fee Exemption Application. The applicant is required to submit (1) the Affliction Certificate (issued by municipal governments), (2) a document which shows the amount of money needed for restoration, and (3) coverage provided for damage by insurance. The applicant who doesn't have (2) and/or (3) should submit the Affliction Certificate (1) first.

Currently, the university receives applications for the exemption of tuition fees for the second semester not only for those affected by the Earthquake, but also for other cases, and the submission deadline is 28 September 2018. Applications are considered on a semester-by-semester basis and in cases where applications have been made for both semesters in 2018, results for the first semester will not necessarily carry over to the second. Students who applied for both semesters already and suffered damage from this Earthquake is advised to apply for exemption again to notify the change of his/her economic status.

Student dormitories
As of 19:30 7 September 2018, all electricity, water, and gas services for the student and researcher dormitories operated by the Student Support Division have been restored.

Contacts for International Students

HUSTEP (Hokkaido University Short-Term Exchange Program): hustep@oia.hokudai.ac.jp

Japanese Language and Culture Studies Program (JLCSP): jlcsp@oia.hokudai.ac.jp

Intensive Japanese Course: rkouryu@oia.hokudai.ac.jp

Modern Japanese Studies Program (MJSP): mjsp@oia.hokudai.ac.jp

Integrated Science Program (ISP): isp@oia.hokudai.ac.jp

Ig Nobel Prize founder visits Hokkaido University for special discussion event

October 1 | University News

Marc Abrahams, founder of the Ig Nobel Prize, visited Hokkaido University on September 26th to participate in a special discussion event titled "Research for Laughter, Research for Thinking". He was joined by two Ig Nobel recipients from Hokkaido University; Professor Toshiyuki Nakagaki, winner of both the 2008 "Ig Nobel Cognitive Science Prize" and the 2010 "Ig Nobel Transportation Planning Prize" for his research on slime molds, and Associate Professor Kazunori Yoshizawa, who won the 2017 "Ig Nobel Biology Prize" for discovering reversed sexual organs in a species of cave insect.

The audience enjoying the event.

Founded in 1991 and dubbed a parody of the Nobel Prize, Ig Nobel Prizes are awarded each year to "achievements that make people laugh, and then think." The award ceremony is held yearly at Harvard University and attended by both Ig Nobel Prize winners and actual Nobel Prize winners. Research awarded an Ig Nobel often become points of interest inside and outside the scientific community. Describing the prize, Abrahams explained "For most people, the immediate reaction when they find something so surprising, so far outside their experience, is laughing. So that's why laughter is an important quality for research and the prize."

During the discussion event, Abrahams challenged Nakagaki and Yoshizawa to try a new style of lectures which he named "Two/Too Lectures." In this lecture, the lecturer explains their research in just two minutes, and then explains the same thing again, in two minutes, but using a completely different metaphor. "When a good teacher finds an explanation does not work and a student does not understand, the teacher tries to think of a completely different way to explain it. I wanted to experiment that today," Abrahams said. Following both two-minute presentations, the audience voted for which short talk was more understandable.

In a Q&A session following the event, a student asked Abrahams for his opinion on current government policies that tend to fund applied research rather than fundamental research. Abrahams responded, "Research is when somebody looks for something that nobody understands yet. It's risky and frustrating. Most of the time you will fail, and you know that in advance. So doing research and funding research is frustrating for governments and companies, but that's the true cost. If you do not spend time and money to do that, it will be much more expensive because it means nothing will ever improve."

At the end of the event, the audience threw paper airplanes at the lecturers, replicating the tradition at the actual Ig Nobel Prize ceremony.

As of now, Japanese researchers have claimed 23 Ig Nobels, and this year marks the 12th consecutive year a Japanese researcher has taken one of the prizes. Hokkaido University is so far the only university in Japan that has produced two winners. From September 22nd to November 4th, Gallery AaMo at Tokyo Dome City is holding the world's first official Ig Nobel Prize Exhibition.

The event was hosted by the Communication in Science and Technology Education and Research Program (CoSTEP) and the university's public relations division, organized by Specially Appointed Assistant Professor Kiyoshi Furusawa of CoSTEP, and held at Enyu Gakusya on Sapporo Campus.

Toshiyuki Nakagaki (left) and Kazunori Yoshizawa (right).

Hokkaido University launches the Institute for Chemical Reaction Design and Discovery (ICRD)

October 9 | University News

Selected to be a part of the World Premier International Research Center Initiative (WPI) by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) of Japan, Hokkaido University will launch the "Institute for Chemical Reaction Design and Discovery (ICRD)" in October 2018. The institute aims to undertake research to acquire an in-depth understanding of complex chemical reactions and to accelerate the efficient development of new chemical reactions. The WPI will support the program for ten years, providing seven hundred million yen each year. The center will be directed by Professor Satoshi Maeda from the Faculty of Science.

Finding new chemical reactions is indispensable for generating advanced materials and chemicals as well as reducing energy consumption and environmental burdens. So far, such development requires a trial-and-error approach which tends to be time-consuming, laborious, expensive, and inefficient. The new institute will tackle this issue by integrating the fields of computational science, information science, and experimental science.

One of the key approaches to elucidate "unknown" reaction pathways is the automated reaction path search method termed "artificial force induced reaction (AFIR)" developed by the new center's director Professor Satoshi Maeda. The AFIR is a novel method used in quantum chemical calculations that applies virtual mechanical forces to reaction systems in search of potential pathways. Calculations can be optimized for complex systems by collaborating with information scientists, and predicted pathways can be tested with experimental scientists. Such interdisciplinary studies are expected to advance current understandings of reaction pathways and networks, leading to the development of innovative products.

The institute aims to build an international research environment with 30% of the researchers from overseas. It has already nominated three internationally renowned scientists from the United States, France, and Germany as Principle Investigators (PIs) as well as eleven from Japan. A research support department will be introduced to allow researchers and students to engage in their research without administrative interruptions. The institute also aims to establish the "MANABIYA" (an old Japanese word for "school") system to educate young researchers and graduate students and function as a global circulation hub for world-class scientists in the field.

Professor Maeda says "Development of new chemical reactions is entangled with the prosperity of humanity and the preservation of environment. As such development often takes decades, fundamentally new scientific approaches have been much anticipated. We are excited to start new challenges to provide innovative solutions through collaborations." President Toyoharu Nawa of the university celebrated the launch saying "We have long waited for this moment and I am very proud of our WPI program. I am committed to fully support the project so it realizes its ambitious goals."

Core members of the institute with President Nawa

Hokkaido University holds its Homecoming Day

October 10 | University News

Hokkaido University's 2018 Homecoming Day was held from September 28th to the 30th, and brought together over 1,800 alumni to "Be Ambitious Again!"

Homecoming Day is an event in which Hokkaido University alumni return to their alma mater. The purpose of the event is to strengthen alumni relations. It also provides opportunities for alumni to connect with each other.

A variety of speeches and functions were held for the 3-day event. Notably, the 2017 Ig Nobel Prize winner Dr. Kazunori Yoshizawa spoke on his research on "a female penis and a male vagina in a cave insect," and live orchestral concerts were held on campus. Departments and institutions across campus also held their own events and meetings.

We invite all alumni to return to Hokkaido University next year and reconnect with us!

Online application periods for MJSP and ISP undergraduate programs announced

HOKKAIDO UNIVERSITY'S
Modern Japanese Studies Program

HOKKAIDO UNIVERSITY ISP Integrated Science Program

September 25 | University News

Our bilingual undergraduate program, the Modern Japanese Studies Program (MJSP), and English-taught undergraduate-graduate program, the Integrated Science Program (ISP), are pleased to announce that online applications are going to open during the following dates:

MJSP online application periods
First call: 25 Oct. 2018 — 22 Nov. 2018 at 5pm JST
Second call: 1 Feb. 2019 — 26 Feb. 2019 at 5pm JST

ISP online application period (for undergraduate admission)
8 Nov. 2018 — 6 Dec. 2018 at 5pm JST

All the latest information on admissions is available on the programs' websites. If you have any questions or concerns, please do not hesitate to contact the program administrators.

Ribbon cutting ceremony

Convenience store chain Seicomart opens new Hokkaido University location

July 26 | University News

The grand opening of Hokkaido-based convenience store chain Seicomart's Hokkaido University location was held on July 24th. The new store is a collaborative project between Hokkaido University and Secoma Co., Ltd. as part of their agreement signed earlier this year to enhance cooperation in the areas of food, safety, and product analysis and development. Both parties expect that these collaborations will contribute to regional communities and economies by blending the academic knowledge and technical skills of Hokkaido University researchers with Seicomart's supply chain capabilities.

Designed by architectural firm Tsuchiya Co., Ltd. the impressive two-story building is a far cry from the typical convenient store image. The first floor is surrounded by floor to ceiling glass walls, providing natural light to the spacious retail area and university information corner within. The familiar Seciomart logo hangs prominently in the center of the store, carved from elm wood obtained from felled trees on the university's campus during the strong 2004 typhoon that struck Hokkaido.

The second floor features a free space with open seating for seminars, events, studying, or eating, and a large outdoor canopied terrace where customers can relax while enjoying the natural beauty of the university campus.

As a trial space for academic and industrial collaborations, Hokkaido University researchers and the corporations have already been able to implement and test some of their recently developed products in the store. For example, the store is currently testing a fuel cell system designed to reduce energy consumption in cold regions, as well as an AI-incorporated road heating system developed by Hokkaido University–Hokkaido Gas collaborations. The store also features a high-protein ice cream developed by Hokkaido University and Secoma.

Interior (left) and exterior (right) of the building

Alumnus Hiroshi Ishii, MIT Media Lab, returns to Hokkaido University

August 22 | University News

Professor Hiroshi Ishii, Associate Director of the Massachusetts Institute of Technology Media Lab, returned to his alma mater, Hokkaido University, to conduct a series of events for students, faculty, staff, researchers, and the public from August 6th to the 7th. A workshop on digital archives was held on the first day, and on the following day he spoke at an international symposium and gave a special talk on envisioning the future.

The international event, "The 2nd GI-CoRE, GSQ, GSB, & IGM Joint Symposium," focused on the fields of "Quantum, Informatics, Biology & Medicine." In his presentation, Dr. Ishii explained the importance of connecting art and science as well as transcending current technologies. His talk "TRANSFORM: Envisioning the Future" entailed tangible examples on how art, science, technology, and design work hand-in-hand to alter how we view reality, connect with other people, and are changing current methods and techniques.

One of the projects he is involved with at the MIT Media Lab, called "Transformative Appetite," takes edible 2D films of protein or cellulose and turns them into food. The project focuses specifically on transforming pasta and modifying its shape, form, and taste.

Dr. Ishii emphasized during the events how crucial expanding one's perception and way of thinking is to continue progressing forward. He also encouraged everyone to embrace originality and to take that step forward to see through with one's ideas.

Assoc. Prof. Takeshi Horinouchi gives invited lecture at COSPAR2018

July 27 | Graduate School News

Associate Professor Takeshi Horinouchi gave an invited lecture at COSPAR2018 held from July 14 to July 22, 2018 in Pasadena, California, USA. COSPAR or Committee on Space Research is an international organization that promotes scientific research in space, and calls a General Assembly every second year, which is one of the biggest conference in space science.

He was one of 4 lecturers selected by the COSPAR Executive Director, the President, and the Chair of the Assembly Scientific Program committee for the Latest Results Session that intends to highlight some recent, outstanding results from world-class scientists. He has been one of world-leading scientists gaining international recognition through his research on Venusian atmosphere by Akatsuki, the Venus Climate Orbiter. (Press Release: Equatorial jet in Venusian atmosphere discovered by Akatsuki)

Spotlight on Research

Participants in a Japanese fire-walking ritual share a drastic and painful experience. (Photo: Christopher Kavanagh)

Group Bonding on Fire

Dr. Christopher Kavanagh, Social Ecology and Psychology Lab

September 18 | Research News

Walking on fire, bathing in ice-cold water, traversing a continent in pilgrimage — the world is full of demanding rituals. And there are countless many ubiquitous and low-key rituals such as meditation practices or attending a regular church service.

"Rituals are in every society and a big part of human interaction. Even where societies are secular, state rituals and public festivals are an important part of the fabric of society," says Christopher Kavanagh, Postdoctoral Visiting Researcher from the University of Oxford, who is working at Professor Masaki Yuki's Social Ecology and Psychology Lab at Hokkaido University. He is studying the psychological effects of participating in or witnessing different rituals, whether rituals result in tighter bonds with fellow participants and if patterns are consistent cross-culturally.

What really distinguishes his research, however, is his emphasis on combining anthropological field research with empirical methods to provide a quantitative foundation for building and testing theory.

There is no shortage of theories within anthropology on why humans in different cultures perform rituals. However, researchers are often unable or uninterested in making predictions and testing their theories. "If we employ open science methods, such as the pre-registration of hypotheses, sharing data, etc., this will improve our predictions and make the tests clearer. We need a framework to allow other researchers to independently reproduce individual results," emphasizes Dr. Kavanagh, who wants to give a voice to anthropologists who see their research as a scientific endeavor.

Participants (left) in and attendees (right) of Shinto rituals answer a questionnaire before and after the performance. (Photos: Christopher Kavanagh [left] and Robert Thomson [right])

He shares the empirical approach to studying society with psychologists, while classical anthropologists usually focus on long term intensive field work, interviews and their interpretation. However, he notes that "psychologists tend to be less interested in field studies and more in experimental studies with much more controlled environments." This is where he thinks an anthropological mindset can be useful as experimental anthropologists typically strive to make things more similar to the actual world at the cost of control," Dr. Kavanagh explains.

Consequently, his data are collected in multiple ways: in online questionnaires targeting specific groups, in carefully designed lab experiments using both self-report questions and implicit tasks, and from surveys and interviews collected at festivals. All data are then analyzed statistically to determine whether they lend support or conflict with specific hypothesized interactions between itemized cultural phenomena such as "pleasantness of common experience" and "preference of in-group members over out-group members."

Dr. Kavanagh elaborates: "Doing experiments in the field is messy but important." He can tell of many examples where the techniques they brought into the field produced very different results from what was anticipated by the theory. However, he suggests these are not always due to flaws of the experimental tools themselves, nor are they shortcomings in the way people respond or behave. "Sometimes we find very different patterns, so while there may be universal aspects to rituals, context matters," he explains, adding: "You don't find that by only looking at recruited students in a lab."

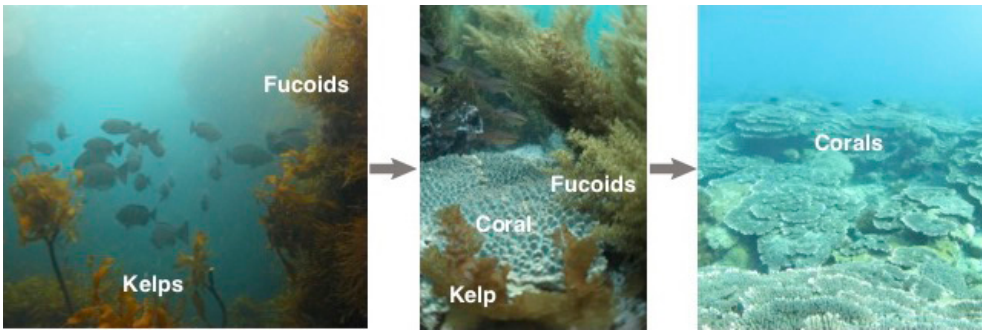
But instead of despairing at this messiness, Dr. Kavanagh points out that this is why collecting data in many regions and in many contexts is so important, because it can help us understand which mechanisms are universal and which are culturally specific.

And Japan is an especially important data point for him. "Japan is unique in that people report very low interest in religious identities, but it still is a highly ritualistic society," he explains. This gives him a chance to separate the effects of ritual and religious belief.

Dr. Kavanagh is part of the international "Ritual Modes Project" funded by the European Research Council and headed by Professor Harvey Whitehouse of the University of Oxford. The project also includes historians trying to apply a quantitative approach to the analysis of rituals recorded in historical cultures. In addition, there are psychologists on the project interested in employing rituals as interventions where people are at risk of engaging in (e.g., terroristic) self-sacrifice to help them bond to different kinds of groups. While he acknowledges the importance of such work, Dr. Kavanagh restrains that such efforts are still in preliminary stages and that "I feel that it might be difficult considering our current limitations in understanding ritual psychology." Nevertheless, he thinks that it is important to inform people about the power rituals have over us so that people are better equipped to understand them and avoid being exploited. "Understanding the basic psychology of rituals is important to understanding human society."

What's behind the retreating kelps and expanding corals?

August 21 | Research News



Climate change and other external forces are causing rapid marine community shifts in Japan's coastal ecosystems. Better understanding of species distribution dynamics, as driven by these factors, can improve conservation efforts and climate change management.

The National Institute for Environmental Studies, Hokkaido University, and the National Institute of Polar Research have shown for the first time that the combined effect of climate warming, dominant poleward-flowing surface currents, and deforestation by intrusive herbivorous fish is behind the rapid community shifts from temperate macroalgae to tropical coral that are taking place in Japan's temperate coastal waters. The study highlights the need for proactive management adapting to current and future climate change, and can aid the conservation of macroalgae beds and coral reefs.

Macroalgae and coral are major habitat-forming organism groups that support high biodiversity and provide important ecosystem services to humans. In Japan, warm-water corals are mainly associated with the subtropical waters of its southern islands while canopy-forming algae are more abundant in the comparatively colder temperate waters of central Japan. In recent years, however, climate warming has allowed corals to gradually expand their distribution into the warmed temperate zone, where the distribution of the less dispersive macroalgae is shrinking.

"This 'tropicalisation' of temperate marine communities is not an isolated phenomenon. It is happening in different places around the world, like in Australia, the Mediterranean or even in the Arctic where it is called 'borealisation' instead," says Hokkaido University Assistant Professor Jorge Garcia Molinos of the research team. "Indeed, it is a natural consequence of climate warming at biogeographical transition zones where multiple species live at or close to their distribution limits, like in our case with the corals and kelps."

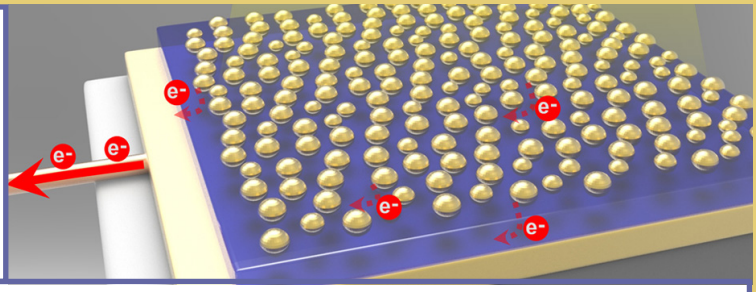
Other than the effect of warming, this phenomenon has been linked to the expansion of tropical herbivorous fish, associated to the corals, and the poleward-flowing, warm ocean currents that facilitate the expansions of both fish and coral into temperate zones. However, this is the first study looking at the relationships among all these factors at a multi-species, community level.

To explain this phenomenon, the researchers examined 439 documents containing tens of thousands of records detailing the occurrence of macroalgae, coral and herbivorous fish across the Japanese archipelago. Using this rich historical database, they reconstructed the shifts in the distribution of the main species, which were then related to long-term variations in spatial patterns of ocean temperatures and current velocity using statistical models to analyze the effects of climate change and ocean currents on community shifts.

The results showed that coral and fish expanded their distribution ranges faster and further than macroalgae. The expansion of macroalgae to the north was outpaced by the shrinkage of their range to the south, while the southern limits of the ranges of most coral remained unchanged. However, all species were found to be shifting their distribution slower than the rate of warming. As expected, such community shifts were mostly observed in zones along the Kuroshio and Tsushima currents, particularly areas around the islands of Kyushu and Shikoku, and primarily associated to an increase in grazing by tropical herbivorous fish. Nonetheless, model predictions for the coming decades suggest a significant increase in the probability of these events occurring elsewhere along the east and west coasts of central Japan. They also suggest that competition between species will increase as a driving mechanism behind the community shifts.

As global warming progresses, living organisms migrate to habitats of a more suitable temperature. However, for some less-mobile organisms the current pace of climate change might prove too fast. "This study demonstrates the magnitude and complexity of influence that climate change has on macroalgae beds and coral reefs and the importance of addressing these issues from a multi-species perspective," says Hokkaido University Associate Professor Masahiko Fujii, who also participated in the study. "We believe this information can be used to help inform proactive adaption to climate change and conserve both macroalgae and coral."

Golden Sandwich could make the world more sustainable



September 10 | Research News

Scientists have developed a photoelectrode that can harvest 85 percent of visible light in a 30 nanometers-thin semiconductor layer between gold layers, converting light energy 11 times more efficiently than previous methods.

In the pursuit of realizing a sustainable society, there is an ever-increasing demand to develop revolutionary solar cells or artificial photosynthesis systems that utilize visible light energy from the sun while using as few materials as possible.

The research team, led by Professor Hiroaki Misawa of the Research Institute for Electronic Science at Hokkaido University, has been aiming to develop a photoelectrode that can harvest visible light across a wide spectral range by using gold nanoparticles loaded on a semiconductor. But merely applying a layer of gold nanoparticles did not lead to a sufficient amount of light absorption, because they took in light with only a narrow spectral range.

In the study published in *Nature Nanotechnology*, the research team sandwiched a semiconductor, a 30-nanometer titanium dioxide thin-film, between a 100-nanometer gold film and gold nanoparticles to enhance light absorption. When the system is irradiated by light from the gold nanoparticle side, the gold film worked as a mirror, trapping the light in a cavity between two gold layers and helping the nanoparticles absorb more light.

To their surprise, more than 85 percent of all visible light was harvested by the photoelectrode, which was far more efficient than previous methods. Gold nanoparticles are known to exhibit a phenomenon called localized plasmon resonance which absorbs a certain wavelength of light. "Our photoelectrode successfully created a new condition in which plasmon and visible light trapped in the titanium oxide layer strongly interact, allowing light with a broad range of wavelengths to be absorbed by gold nanoparticles," says Hiroaki Misawa.

When gold nanoparticles absorb light, the additional energy triggers electron excitation in the gold, which transfers electrons to the semiconductor. "The light energy conversion efficiency is 11 times higher than those without light-trapping functions," Misawa explained. The boosted efficiency also led to an enhanced water splitting: the electrons reduced hydrogen ions to hydrogen, while the remaining electron holes oxidized water to produce oxygen — a promising process to yield clean energy.

"Using very small amounts of material, this photoelectrode enables an efficient conversion of sunlight into renewable energy, further contributing to the realization of a sustainable society," the researchers concluded.

Japan's Largest Complete Dinosaur Skeleton Comes to Life

September 19 | University News

The unearthed bones of "Mukawaryu," Japan's largest complete dinosaur skeleton, have now been prepared and pieced together, giving us a fuller and clearer image of the 72 million-year-old dinosaur.

Excavations of "Mukawaryu," the largest complete dinosaur skeleton in Japan, began in 2013 in the Hobetsu district of Mukawa Town on Japan's northernmost island of Hokkaido by the Hokkaido University Museum and Hobetsu Museum research teams. Although many bones have not yet been identified, the majority have been and those which can be pieced together now present a more accurate depiction of the dinosaur's anatomy.

"Mukawaryu" was recovered from marine deposits dating back to the Late Cretaceous Period around 72 million years ago. The skeleton has been identified as a duck-billed dinosaur (Hadrosauridae). These herbivores thrived in Eurasia, North and South America, and Antarctica.

The "Mukawaryu" skeleton revealed in 2017 was defined as a complete skeleton, as it contained more than 50% of the bones, but now an estimated 60% of the bones have been confirmed as well as 80% of the entire expected skeletal volume. With a significant amount of cranial bones pieced together in addition to more shoulder, forelimb, hip, hindlimb, and backbones, the skeleton is now more discernable.

"There are still many unidentified bones and fossils that need to be restored," said Associate Professor Yoshitsugu Kobayashi of the research team. "We will continue researching "Mukawaryu," analyzing its bones, and unraveling more details of this creature. We also hope to further clarify its systematic position, determine any related species and the ecology of the environment it lived in."

Follow us on:

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Interested in being featured in the next issue or have any comments?
Email pr@oia.hokudai.ac.jp. Please also check out the Hokkaido University Times webpage.