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Cover photo:
Autumn brings many visitors to Ginkgo Avenue

Hokkaido University Ranked in Reuter’s Top 100 “World’s Most Innovative Universities

October 12 | University News

Hokkaido University obtained a spot within the Top 100 of Reuters’ annual “World’s Most Innovative Universities” ranking, coming in at number 90. This marks a five-spot jump over last year, when Hokkaido University was ranked number 95 on the same list.

Last June, Hokkaido University was also ranked number 23 in the 2018 edition of Reuter’s list of Asia

Pacific’s Most Innovative Universities. Both rankings are based on several metrics monitoring the university’s research output, including the number of patents issued globally and the number of academic citations originating from Hokkaido University research papers. [A Reuters’ article](#) describing Hokkaido University’s ranking mentioned Professor Akira Kakugo’s studies on [swarming molecular robots](#) and Professor Masako Kato’s work on developing

a [new sensor material](#) as being particularly noteworthy.

For the fourth year in a row, California’s Stanford University topped the rankings. You can see the full rankings list here: <https://www.reuters.com/article/us-amers-reuters-ranking-innovative-univ/reuters-top-100-the-worlds-most-innovative-universities-2018-idUSKCN1ML0AZ>

Top aspiring entrepreneurs selected at Hult Prize Campus Final



December 19 | University News

On Saturday, December 15th, Hokkaido University student teams pitched their business ideas to four qualified judges to win the [Hult Prize @ Hokkaido University](#) Campus Final.

The Hult Prize is the world’s largest student entrepreneurship

competition, bringing together more than 1 million young people from over 100 countries to tackle challenges adversely affecting contemporary society. The winner of the Hult Prize receives 1 million dollars in start-up funds for their business.

The theme of the 2019 Hult Prize is “Youth Unemployment; Can you

create a venture that provides 10,000 meaningful jobs for youth within the next decade?” The teams participating in the Hult Prize need to formulate detailed, sustainable and actionable plans to help solve this issue whilst also considering the role of their business in addressing the United Nations’ Sustainable Development Goals.

Hokkaido University has one of Japan's longest running On Campus programs. This year marks the university's 4th Campus Final, which comprised a total of 14 teams from both Sapporo and Hakodate campuses, and students from over 15 countries. Team Dziko Langa, Team AQUAMOU, and Team Floatmeal were selected as the Top 3 teams. Team Dziko Langa, the 1st place team, will automatically advance to the Regional Competition. Although the locations of the Regional Competitions have yet to be decided, this year will be the first that one will be held in Japan.

Team Dziko Langa, whose project surrounds creating an efficient and sustainable recycling system in Zambia, described their upcoming plans with enthusiasm shortly after the competition:

“We are very passionate about this project. Issues of health, waste, poverty, creating a more sustainable environment...these are issues that need to be tackled, and they are issues we had faced in our daily lives in Zambia. And it is the young people really driving change. We believe that if we put power back in their hands, they will support our cause as well as our business to create a more sustainable environment for all.”

The winners of the Regional Competitions in March or April 2019 will then participate in an Accelerator Program in the United Kingdom before moving on to the Hult Prize Finals in New York late next summer. There, the team which wins the competition will receive the prize money to kick-start their business.



Team Dziko Langa won the Campus Final and will be automatically moving on to one of the Regional Competitions. Their motto is “Turning waste into wealth.”



Team AQUAMOU, composed of students from the Graduate School and Faculty of Fisheries Science at Hakodate Campus, were granted 2nd place for their project to boost local aquaculture production in Nigeria.



Team Floatmeal came in 3rd place for their innovative plan on utilizing micro-farming and maximizing the potential of the plant protein market.

“This competition is very tough for all of the students,” said Hult Prize @ Hokkaido University Campus Director Rina Tsuboi, “However, this is the first time every Hokkaido University team presented at the Campus Final. I was very moved that everyone gave it their all. My goal now as Campus Director is to support the winning teams so they can win in the Regional

Finals.”

Hult Prize @ Hokkaido University is sponsored and supported by both internal and external companies, including Amino Up Co., Ltd., No Maps, and the Sapporo Chamber of Commerce and Industry.

Hokkaido Summer Institute 2019 courses finalized!

December 11 | University News

The season for the [Hokkaido Summer Institute](#) (HSI) is approaching once again! More than 160 world-leading researchers from overseas will gather at Hokkaido University this summer for the HSI, which was established in 2016 and provides lectures with the university's faculty members for four months during the summer.

Last summer, more than 1,700 students joined HSI 2018 to study a wide range of disciplines from literature to engineering. The university continues to expand the program, and for this coming summer there will be 139 courses (116 graduate courses and 23 undergraduate courses) between June 3rd to October 18th.

How many courses will you take? [Visit the HSI website and check out the courses.](#)

Online early application acceptance period

Open: February 1st (Fri.), 2019
Close: February 28th (Thu.), 2019

Please refer to the HSI website for other application periods. We look forward to receiving your applications from all over the world!

This summer, discover the world anew. Study amongst the beauty of Hokkaido, Japan



HOKKAIDO
SUMMER
INSTITUTE

Program Highlights	Courses
1. Study at one of the most pristine and scenic areas in Japan while enjoying the scenic beauty of Hokkaido, Japan.	HSI 2019 will offer over 130 courses ranging from bachelor to Ph.D level.
2. Spend your summer at the most beautiful region in Japan.	Free
3. Take your unique summer program by combining courses according to your major and interests.	Tuition fee: 14,800 JPY per credit
4. Gain academic credits.	Tuition fee will be waived for students who enroll in the program as exchange students from HUI partner universities.
5. Enjoy everything Hokkaido and Sapporo has to offer.	

Online Early Application
February 1-28, 2019 For more details, visit our website and Facebook.
<https://hokkaidosummerinstitute.oia.hokudai.ac.jp>
<https://www.facebook.com/hokkaidosummerinstitute>

MJSP second call for applications

December 18 | University News

The university's bilingual bachelor's degree program, the [Modern Japanese Studies Program \(MJSP\)](#), will be accepting applications for the Intensive Japanese Course starting in October 2019, and the regular Bachelor's Degree course starting in April 2020.

Online application period (second call)

February 1st - February 26th, 2019

The application materials must be

sent by post after making an online application. This must be received by March 11th, 2019, 5:00 p.m. (JST).

For all of the latest information about admissions, please see the [MJSP website](#).



HOKKAIDO UNIVERSITY'S
Modern Japanese Studies Program



Brand-new concept car “ItoP” debuts on campus

November 22 | University News

The brand-new concept car “ItoP” made its debut at Hokkaido University’s Sapporo Campus. Journalists were invited along for test rides as the research and development team held the ItoP’s first public demonstration drive during a three-day event lasting from November 16th to 18th.

The ItoP was developed as part of ImpACT, a national research project which aims to bring about disruptive innovation in society and industry through an integration of the finest R&D capabilities in academia and industry in Japan.

Among sixteen ImpACT programs, Professor Kohzo Ito from The University of Tokyo leads the project called “Realizing Ultra-Thin and Flexible Tough Polymers,” involving more than 20 universities and corporations in Japan. This program attempts to develop tough and yet flexible polymers that achieve a level of both thinness and toughness which exceeds conventional limits.



Such polymers are expected to help realize a more energy-efficient, safe, and sustainable society.

Named for the concept of “Iron to Polymer,” ItoP was developed in Professor Ito’s program to showcase its R&D concept and technological



Dr. Kohzo Ito (right) of The University of Tokyo, President Toyoharu Nawa (center) and Dr. Jian Ping Gong (left) of Hokkaido University

achievements. About 80 percent of the components used to build the car, including the body frame, tires, and windows, are made from different types of polymers the team has developed, successfully reducing the body weight by 38% and greenhouse

gas emissions by 11% to those of a conventional car. Their polymer technologies are also used in the ItoP’s fuel cell, its Li ion battery as well as its front and rear suspensions.

The rubber used for the tires was developed by the Bridgestone corporation based on the double network gel technology devised by Professor Jian Ping Gong’s laboratory at Hokkaido University. The technology integrates two different kind of polymers, one rigid and brittle and the other flexible and stretchable, to make the material far tougher than conventional polymer-based materials. This has enabled the ItoP’s tires to be lighter and thinner than conventional tires, contributing to higher fuel efficiency.

The novel polymers developed in this program could have a widespread ripple effect throughout the polymer industry in the future.

Associate Professor Shigeru Aoki selected to lead the Japanese Antarctic Research Expedition (JARE)

November 14 | University News



Associate Professor Shigeru Aoki of Hokkaido University's Institute of Low Temperature Science was selected to become the leader of the 61st Japanese Antarctic Research Expedition. The decision was made at the 153rd JARE general assembly meeting, hosted on November 8th by the Japanese Ministry of Education,

Culture, Sports, Science and Technology. This marks the first time that a representative from Hokkaido University has been selected for the post.

The 61st Expedition corresponds to the fourth year of the "Japanese Antarctic Research Project Phase IX," a 6 year-long project launched in 2016. The main theme of the expedition is "Variations of global systems revealed by Antarctic observations," and will consist of observational activities on glacial, marine, and sea ice properties, utilizing the "Shirase" research vessel in order to try and further explain the relationship between ocean waters and ice sheets. The expedition will be carried out over a four-month period from late 2019 into 2020. Preparations including member selection, training, and acquiring supplies, will be conducted over the upcoming year.

Sharing his thoughts on his selection, Dr. Aoki commented "I feel somber, as being leader of the expedition is a serious responsibility. The international community is expecting results from the Japanese research being conducted in the Antarctic. In addition to continuing to build on the past 60 years of work that JARE has undertaken, I would also like to successfully conquer new challenges during the 61st expedition."

Dr. Aoki has previously been a member of the 39th Winter Expedition, as well as the 43rd and 56th Summer Expeditions. He has also participated in several Australian-sponsored research ship expeditions. In addition to his duties as leader of the 61st Expedition, Dr. Aoki will also serve as leader of the Summer Expedition.

Photo taken by Kazuya Ono.



Hokkaido University Ambassador and Partner System website launched!

November 2 | University News

The website for the Hokkaido University Ambassador and Partner System was launched on October 31st, 2018. The system was created in 2016 to expand the university's global network and activities. Titles are granted to alumni and other affiliates who have contributed to the academic development of Hokkaido University or have engaged in promotional activities of the university or any of its affiliated organizations.

Ambassadors and partners play important roles for the university's community by strengthening ties with its alumni associations, connecting with prospective and current students, and conducting outreach events. There are ambassadors and partners in almost all countries and regions where Hokkaido University alumni live.

The new website features interviews and articles about the university's ambassadors and partners, personal

profiles so you can learn more about those involved with the system, and more. Current members of the system can also use the website to submit reports and requests.

Stay up to date with the many activities being done around the world to keep Hokkaido University ambitious!

Hokkaido University Ambassador and Partner System website: <https://www.global.hokudai.ac.jp/huap/>

Liposome Research Days 2019

December 7 | Academic Conference News

Liposome Research Days (LRD) was established in 1990. The 5th LRD (1996) was held in Shizuoka and the 11th LRD (2008) was held in Yokohama. We are happy to have next LRD meeting in Sapporo.

This meeting will feature a variety of presentations spanning the gamut from basic lipid research to applied research on drug delivery system (DDS) and clinical applications.

Oral and Poster presentations are open in the following fields:

1. Biophysical Chemistry, 2. DDS (Cancer), 3. DDS (Nucleic acid, gene), 4. Vaccines, 5. Microfluidics

We look forward to welcoming you to Sapporo and to some lively discussions over beer and delicious Hokkaido cuisine at the famous Sapporo Beer Garden!



Liposome Research Days 2019

International Organizing Committee

Terry Allen, Canada
Carl Alving, USA
Thomas L. Andresen, Denmark
Marcel Bally, Canada
Chezy Barenholz, Israel
Pieter Cullis, Canada
Alberto Gabizon, Israel
Gregory Gregoriadis, UK
Leaf Huang, USA
Tatsuiro Ishida, Japan
Hiroshi Kikuchi, Japan
Kazuo Maruyama, Japan
Naoto, Oku, Japan
Yvonne Perrie, UK
Avi Schroeder, Israel
Gert Storm, Netherlands
Frank Szoka, USA
Vladimir Torchilin, USA
Yuhong Xu, China

Date September 15(Sun.) -18(Wed.), 2019

Venue Hokkaido University Conference Hall

Chair Hideyoshi HARASHIMA Prof.
Faculty of Pharmaceutical Sciences, Hokkaido University

The Liposome Research Days (LRD) Conferences started in 1990. The 5th and 11th LRD were held in Japan, in 1996 in Shizuoka, and in 2008 in Yokohama. LRD will be held in Sapporo, Japan in 2019. It will focus on all aspects of lipid and liposome research from basic research in biochemistry/biophysics to clinical application of nanoparticles.

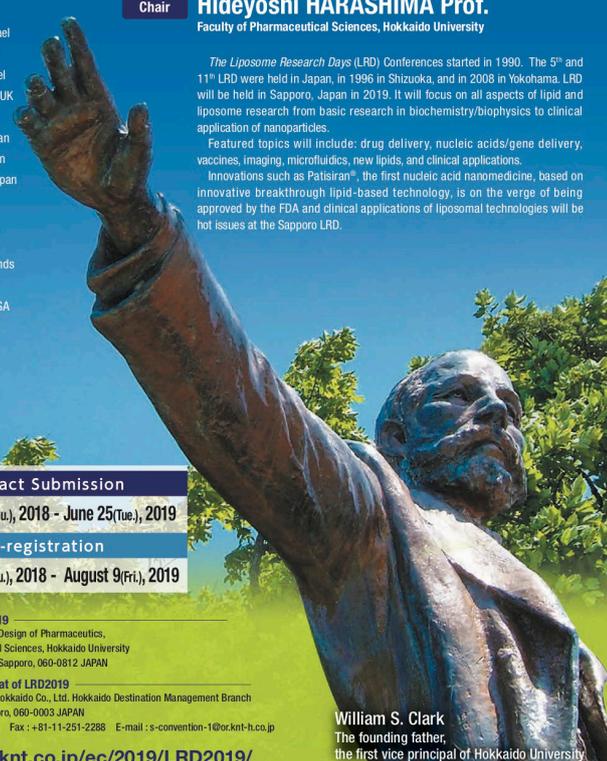
Featured topics will include: drug delivery, nucleic acids/gene delivery, vaccines, imaging, microfluidics, new lipids, and clinical applications. Innovations such as Patisiran[®], the first nucleic acid nanomedicine, based on innovative breakthrough lipid-based technology, is on the verge of being approved by the FDA and clinical applications of liposomal technologies will be hot issues at the Sapporo LRD.

Abstract Submission

December 20(Thu.), 2018 - June 25(Tue.), 2019

Pre-registration

December 20(Thu.), 2018 - August 9(Fri.), 2019



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<http://www.knt.co.jp/ec/2019/LRD2019/>

William S. Clark
The founding father,
the first vice principal of Hokkaido University

Being promiscuous to ensure reproduction

October 9 | Research News

Females of a socially monogamous passerine, the Japanese great tit (*Parus minor*), become more promiscuous after hatchings fail in the first breeding attempt – apparently attempting to ensure successful reproduction.

Many organisms, including human beings, form monogamous relationships. Birds are particularly so, with 90 percent of species exhibiting monogamous relationships. Indeed, a pair of birds conjures up the image of a “happily married couple.” Yet after paternity tests based on DNA analyses were introduced in the 1990s, it was discovered that, in more than 75 percent of monogamous bird species, females had mated with other male birds, producing offspring whose genetic father is not the mother’s partner – the phenomenon called extra-pair paternity.

“Universality of extra-pair paternity in monogamous birds was shocking and much research has been performed on extra-pair paternity among various species in the last 30 years. However, how flexibly individual females behave to changing circumstances when

selecting mates has been largely unexamined due to the difficulty of controlling conditions in wild populations,” explains Itsuro Koizumi, an Associate Professor of Hokkaido University.

In the present study published in *Behavioral Ecology*, Koizumi and his students manipulated hatching success of a wild population of Japanese great tits, which are known to reproduce more than one time in a mating season. This experiment was conducted in Hokkaido University’s Tomakomai Experimental Forest in northern Japan.

All eggs laid in the first breeding by 11 pairs were replaced with artificial eggs to simulate hatching failure. These pairs were compared to 18 control pairs whose eggs were not manipulated. The researchers then examined how the degree of extra-pair paternity changes in their subsequent breeding attempt, speculating that females of experimental pairs would be more promiscuous to improve reproductive success in their second breeding attempt.

Paternity tests on 457 chicks from 58 broods using microsatellite DNA showed that 62 chicks, or 13.6 percent of the total, were born “out of wedlock.” While the rate of chicks born from extra-pair paternity in the control group was roughly the same in the first and second breeding attempt, the rate in the experimental group jumped significantly in the second attempt. The extra-pair paternity rate in the second brood of the experimental group was 40 percent higher than that of the control group.

There were only a few days between when the females learned of the hatching failure and the beginning of the second breeding attempt.



A nest in which genuine eggs (bluish) were laid in the second breeding over the artificial eggs (yellowish) that had been incubated. The birds were unable to distinguish them and treated them all as genuine.

This means that female birds in the experimental group swiftly decided to mate with other males while still in relationships with their original partners.

“Switching partners between the breeding attempts carries the risk of being unable to find a replacement partner in a timely manner. That

seems to be why they stay with original partners but become more promiscuous to ensure successful reproduction,” says Dr. Teru Yuta of the Yamashina Institute for Ornithology, a former PhD student of Hokkaido University. “The reason females engage in extra-pair paternity has been a challenging puzzle for behavioral ecologists. This study not

only suggests that individual females flexibly alter their mating behavior in an adaptive way, but also is the first experimental evidence for the ‘direct fertility benefit hypothesis’ which has been long-debated as the cause of the evolution of extra-pair paternity,” he added.

New method enables large-scale production of bio-based plastic bottles

November 12 | Research News

Scientists have discovered a novel method to synthesize furan-2,5-dicarboxylic acid (FDCA) in a high yield from a glucose derivative of non-food plant cellulose, paving the way for replacing petroleum-derived terephthalic acid with biomaterials in plastic bottle applications.

The chemical industry is under pressure to establish energy-efficient chemical procedures that do not generate by-products, and using renewable resources wherever possible. Scientists believe that if resources from non-food plants can be used without putting a burden on the environment, it will help sustain existing social systems.

It has been reported that various useful polymers can be synthesized from 5-(hydroxymethyl)furfural (HMF), the biomaterial used in this study. A high yield of FDCA can be obtained when HMF is oxidized in a diluted solution

under 2 weight percentage (wt%) with various supported metal catalysts. However, a major stumbling block to industrial application lies with the use of a concentrated solution of 10-20 wt%, which is essential for efficient and scalable production of FDCA in the chemical industry. When HMF was simply oxidized in a concentrated solution (10 wt%), the FDCA yield was only around 30%, and a large amount of solid by-products was formed simultaneously. This is due to complex side reactions induced from HMF itself.

In the study published in *Angewandte Chemie International Edition*, a Japan-Netherlands research team led by Associate Professor Kiyotaka Nakajima at Hokkaido University and Professor Emiel J.M. Hensen at Eindhoven University of Technology succeeded in suppressing the side reactions and producing FDCA with high yields from concentrated HMF solutions (10~20 wt%) without by-products formation. Specifically, they first acetalized HMF with

1,3-propanediol to protect by-product-inducing formyl groups and then oxidized HMF-acetal with a supported Au catalyst.

About 80% of 1,3-propanediol used to protect formyl groups can be reused for the subsequent reactions. In addition, drastic improvement in the substrate concentration reduces the amount of solvents used in the production process. Kiyotaka Nakajima says “It is significant that our method can reduce the total energy consumption required for complex work-up processes to isolate the reaction product.”

“These results represent a significant advance over the current state of the art, overcoming an inherent limitation of the oxidation of HMF to an important monomer for biopolymer production. Controlling the reactivity of formyl group could open the door for the production of commodity chemicals from sugar-based biomaterials,” says Kiyotaka Nakajima. This study was conducted jointly with Mitsubishi Chemical Corporation.

Beware of evening stress

November 27 | Research News

Stressful events in the evening release less of the body's stress hormones than those that happen in the morning, suggesting possible vulnerability to stress in the evening.

The body's central system reacts less strongly to acute psychological stress in the evening than it does in the morning, according to research conducted at Japan's Hokkaido University.

In the study published in the journal *Neuropsychopharmacology Reports*, medical physiologist Yujiro Yamanaka and his colleagues recruited 27 young, healthy volunteers with normal work hours and sleep habits to find out if the "hypothalamic -pituitary-adrenal" (HPA) axis responds differently to acute psychological stress according to the time of day.

The HPA axis connects the central nervous and endocrine systems of the body. Cortisol, the primary stress hormone in humans, is released for several hours when the HPA axis is activated by a stressful event. This helps provide the body with energy in the face of a perceived need for fight or flight. Cortisol levels are also regulated by a master circadian clock in the brain, and are normally high in the morning and low in the evening.

The team first measured the diurnal rhythm of salivary cortisol levels from

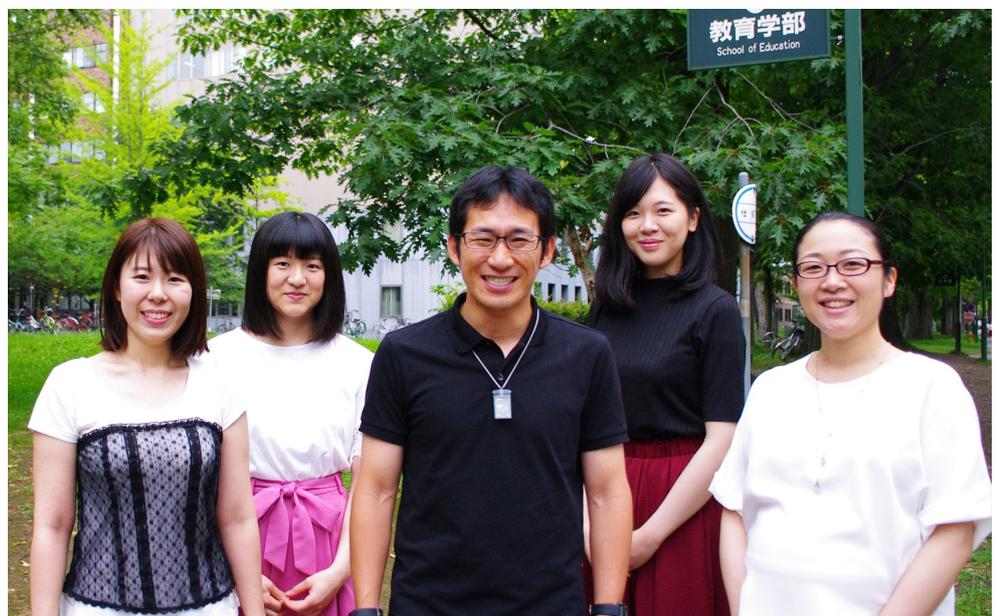
the volunteers to establish a baseline. The volunteers were then divided into two groups: one that was exposed to a stress test in the morning, two hours after their normal waking time, and another that was exposed to a stress test in the evening, ten hours after their normal waking time.

The test lasted for a period of 15 minutes and involved preparing and giving a presentation in front of three trained interviewers and a camera, and conducting a mental arithmetic. Saliva samples were taken half an hour before starting the test, immediately after, and at ten-minute intervals for another half hour.

The researchers found that salivary cortisol levels increased significantly in the volunteers that took the stress test in the morning while no such response was observed in those that took the test in the evening. The

volunteers' heart rates on the other hand, an indicator of the sympathetic nervous system which immediately responds to stress, did not differ according to when the test was taken.

Yujiro Yamanaka commented "The body can respond to the morning stress event by activating the HPA axis and sympathetic nervous system, but it needs to respond to evening stress event by activating the sympathetic nervous system only. Our study suggests a possible vulnerability to stress in the evening. However, it is important to take into account each individual's unique biological clock and the time of day when assessing the response to stressors and preventing them."



Associate Professor Yujiro Yamanaka (center) and the lab members.

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