

Kyoto University  
2019 Autumn

# KYOTO U

## Research News



# A new humanities for a new Asian future

Kyoto University's receipt of 'Designated National University' status from the Japanese government in June 2017 — establishing it as one of a select number of model institutions for the future of Japanese higher education — hinged in part on a defining feature of our proposal: the promotion of an Asia-centric, globally-oriented study of the humanities and social sciences.

This is in keeping with KyotoU's academic traditions, which have long been informed by the holistic nature of our scholarship: social sciences and field studies lending context and meaning to the natural sciences, which in turn — through deep interconnections with partners throughout Asia and the world — form a rich network of cross-disciplinary collaboration spanning borders and regions.

Spearheading this effort is the newly-formed, cross-departmental and multi-disciplinary research unit — profiled in the first section — whose name in Japanese includes the phrase *mirai-gata hasshin*, or future-oriented

broadcast/expression, representing the forward-thinking, outwardly-oriented nature of the effort. Among its other duties, the unit will serve as the editorial board for an annual English-based publication comprised of the best of KyotoU's humanities and social sciences output.

Leading the unit is Yasuo Deguchi, a professor of philosophy steeped in the intellectual traditions of the Kyoto School as well as in Eastern and Western modes of thought. With his wealth of ideas, experience, and personal and global connections, his appointment marks a bold new step toward broadening understanding of the humanities and social sciences in the modern era, while continuing to have the ideas and thinking of these schools inform and lend broader meaning to all of our scholarly endeavors.

Nagahiro Minato, Exec VP/Provost



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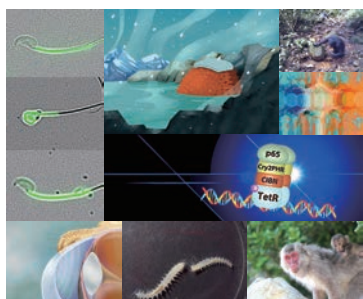
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## On the cover

On the front, contemporary leading minds of KyotoU's HSS depicted in *ukiyo-e* style (from left: Profs Deguchi and Uehara with Pres Yamagiwa) in front of the historic *Chinretsukan* on the main Yoshida campus, and on the rear HSS giants of the past (historian Ichisada Miyazaki, philosopher Kitarō Nishida, and naturalist Kinji Imanishi) in front of the original Faculty of Literature building. (Trais/Fujiwara)

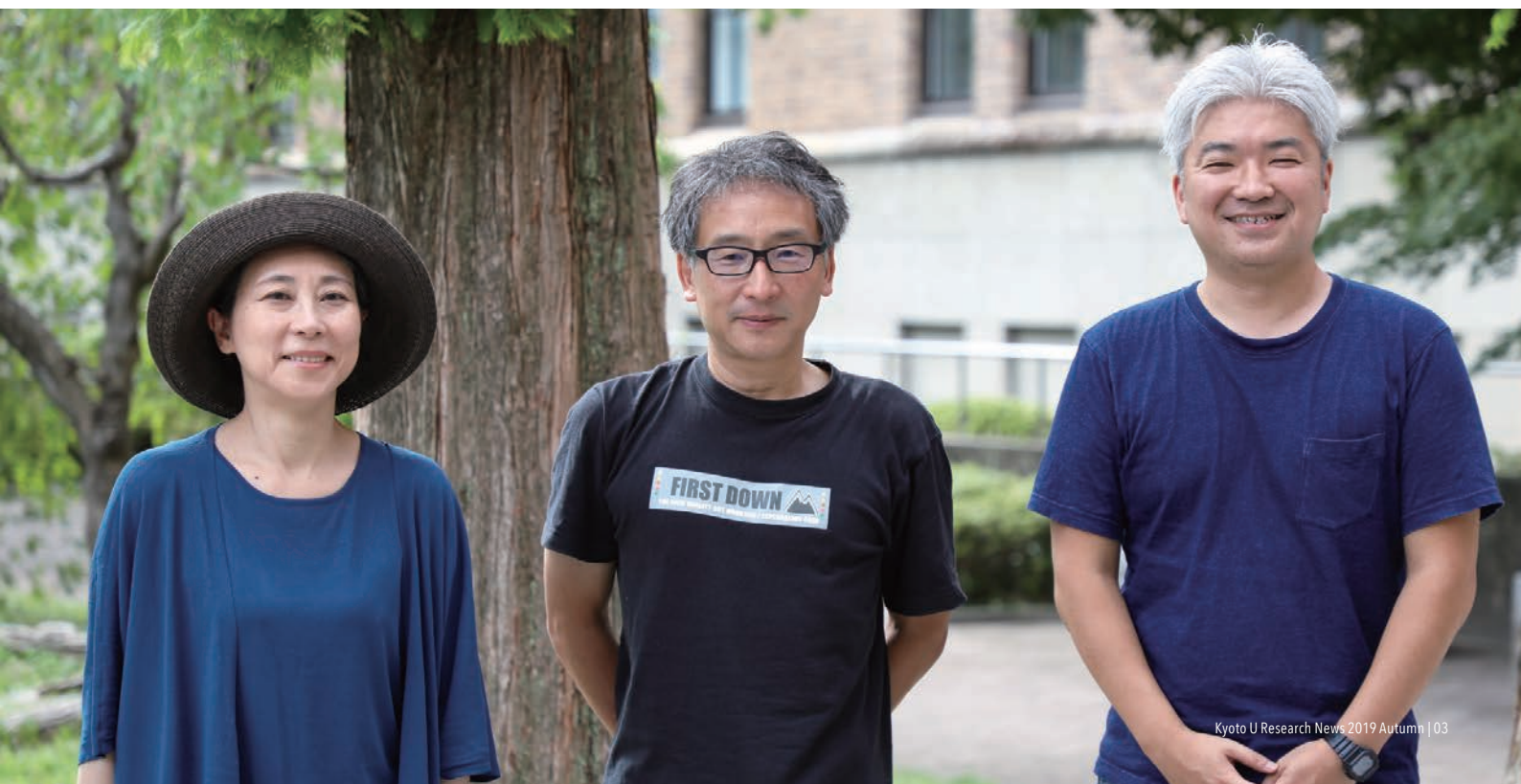


人社未来形発信ユニット  
Unit of Kyoto Initiatives for the Humanities and Social Sciences

# An Asian Humanities, for the future

Study of the humanities and social sciences of Asia is nothing new. But whereas such inquiry has typically been based on Western principals of thought and analysis, is it not possible to begin anew, from an Asian perspective, to identify and define a study of HSS of Asia, for Asia?

Answering with an emphatic 'yes' is **Yasuo Deguchi**, center, professor of philosophy, and his colleagues of the *Unit of Kyoto Initiatives for the Humanities and Social Sciences*. A cross-disciplinary project designed as one of the pillars of the University's Designated National University (DNU) framework, UKIHSS draws on the breadth of the fields of inquiry on campus, coupled with the depth of tradition in philosophy and pan-Asian history and field study spanning KyotoU's nearly 125-year long history. Also pictured below are (on the left) professor of philosophy **Mayuko Uehara** and unit associate professor **Takuro Onishi**, representing the over two-dozen scholars active in promoting the unit's endeavors.



# An Asian Humanities, for the future



## A winding path

Making such a strong statement in favor of HSS has not been easy. Merely three years previous, the mood at the ministry level — with backing from industry, facing crises in manufacturing and a predicted decline in national scientific prowess — was leaning toward reduction of investment in HSS research and education.

But a backlash among the academic community ensued, led in part by strong opposition from KyotoU scholars, who pointed to the nation's long history and deep traditions in literature and the arts as clear examples of the core of Japan's cultural strength, which have contributed to the enrichment of human civilization across the globe.

So in 2017 when KyotoU's DNU proposal was approved by the

education ministry MEXT, containing a statement of unequivocal support for HSS, a watershed was reached.

## From the grassroots

Fast-forward to the winter of 2019. In his office lined with bookshelves stacked with volumes ranging from the study of optics to Buddhist thought, philosopher Deguchi huddles with Onishi, his deputy-in-command of HSS unit affairs,



Thomas Kasulis deconstructing 'nothingness' in the style of the Kyoto School

## Yasuo Deguchi

Professor of Philosophy

*Excerpted closing remarks from the First HSS Symposium, "The Future of an Asian Humanities", Saturday 27 April*



As we bring this meeting to a close, you might wonder how it would be possible to tie together all of the threads of thought we've heard today, but since that is my job as a philosopher, I've succeeded in tying them up (laughter).

The common theme throughout today's talks is the physical body. In the discussion of Nishida's Kyoto School teachings, we heard of the physical actions of sitting and of meeting face-to-face with others; in the history discussion we heard of gathering in departmental offices and buildings and of traveling to other countries to conduct research; and in the case of field work, we learned of the most physical sort of experience of all, where a researcher travels to remote places to live and work.

The humanities and social sciences are a compendium of these physical experiences, beginning with the individual conducting research, expanding to modes of thought centered in departments, and finally encompassing the university as a whole.

Looking back at the Kyoto School, physicality has always played a key role in their thinking. But in the current age, where everything we think we need to know can be gleaned from smartphones in the palms of our hands, are we not losing touch with physicality? Is this not a crisis of our existence?

If the past is a signpost to the future, then surely these numerous patterns of thought — sharing as they do the common element of physical existence — together mean that our studies in Kyoto of the humanities and social sciences will point the way forward through this crisis, lending meaning to our very existence.

as they make final plans for the coming school year's double symposia.

(For more on Deguchi's book collection see [youtu.be/V0xoSaNnVkU](https://youtu.be/V0xoSaNnVkU))

This ambitious start befits the high expectations surrounding the unit as it seeks to understand the roots of HSS in Kyoto, untangle the branches that have split into myriad directions in the decades since, and project a clear and unified vision for these disciplines moving forward.

# An Asian Humanities, for the future

## Juichi Yamagiwa

President

*Excerpted closing remarks from the First HSS Symposium*



No one today has mentioned what became of the Kyoto School: its unspoken shame of the war years. But in spite of this past, the day has surely come when we must look back to the core ideas of the School, and to what these meant for the original group of thinkers in the early years of the 20th century.

Philosophy was overtaken by biological science, which in turn was overtaken by information technology. The discovery of DNA's double-helix in mid-century ushered in an era where we can begin to understand life's deepest secrets, without the aid of philosophy.

Human society has evolved to the point that we live less in reality than in a fictionalized version of reality; our cities increasingly reflect this fictional vision rather than their true origins in nature. Is this really the future in which we wish to live?

One of the key themes to emerge from this symposium is the physical body; the physicality of our existence is the key to our humanity, giving meaning to our endeavors. It is for this reason that we look to the study of the humanities and social sciences to understand what we truly are.

"One important mission is the transmission of knowledge," explains Onishi, "brining the fruits of what we have learned to the public." Big symposia are a start, he elaborates, but smaller meetings, seminars, outreach to schools and local communities, and other grassroots endeavors, will be necessary as well.

Ultimately, individual unit members representing a spectrum of HSS fields will conduct these activities on a person-to-person level. The team shares a vision of not merely pooling knowledge, but of learning together with a wider

community extending far beyond the bounds of the campus.

## Understanding others

"Mutual understanding will be a key feature of our inquiry," says Deguchi.

The role of HSS, he says, is dynamic: to live in other cultures, be steeped in other ideas, believe other faiths, and experience other lives. By then bringing these back into our comfortable, everyday existence, and going through the process of transmission described by Onishi, we can begin to realize the potential of HSS.

And where will this lead? Deguchi answers without hesitation: "To world peace."

## A foundation of meaning

KyotoU's president Juichi Yamagiwa sees other connections as well. Himself a natural scientist and Japan's foremost gorilla expert, he has come to see HSS as being a basis — and providing a moral framework — for the natural sciences. Lacking such a foundation, science and technology might simply run amok, ending in the destruction of the very humanity we seek to preserve.

It is a darker, more cautionary corollary to Deguchi's vision, starkly illustrating the high stakes these academic endeavors entail. Yamagiwa, who has made a strong push nationally for forbidding the use of military funds in university labs, sees the fork in the path ahead as representing a clear moral difference.





## Two down, more to come

As 2019 turns to autumn and the unit begins planning for its second year, Deguchi is optimistic. Dispelling earlier fears that their audacity might be met with skepticism or — even worse — indifference, the positive academic and public response to the meetings in April and August have renewed his enthusiasm and eagerness to continue and to expand.

Throughout these pages, details about both symposia can be seen in flyers from the meetings — depicted in manga form for the first event — as well as in excerpted remarks from the organizers.

The HSS unit plans more meetings and events in Kyoto and beyond as it continues its inquiry into an Asian Humanities, a field as diverse and dynamic as Asia itself. Updates (primarily in Japanese) are posted regularly on the unit’s website and social media, which can be found via a search for “ukihss”.

### Mayuko Uehara

Professor of Philosophy

*Excerpted introductory remarks from the Second HSS Symposium, “Women Creating an Asian Humanities”, Friday 23 August*



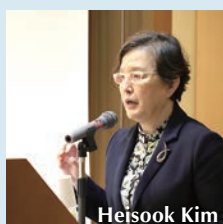
The impetus for holding this second symposium stems from two purposes: that it builds on the achievements of the first symposium, and that it is being held in tandem with the second conference of the *Asian Association for Women Philosophers*, AAWP.

The first HSS symposium, held in April, presented a broad overview of what we are attempting to achieve with our study of an Asian Humanities. History, philosophy, and field study were examined in the context of the past, present, and future of Kyoto University and Asia.

Meanwhile the three-day AAWP conference, of which this symposium represents the afternoon of the second day, continues to break new ground in explorations of philosophical study by women in Asia, this time under the general theme of “Gender, Power, and Dignity in Theory and Practice”.

In keeping with this theme, today’s symposium seeks practical solutions to problems faced by women in Asia, looking beyond philosophy to draw upon the wisdom of gender studies, sociology, and education, in particular featuring **Heisook Kim**, President of Ewha Womans University in South Korea — and a colleague in philosophy — as well as Vice-President **Miho Mitsunari** of Nara Women’s University, Professor **Emiko Ochiai** of sociology, and doctoral candidate in education **Minako Saigo**.

Each speaker brings a uniquely personal perspective to her studies, both as women conducting research, and in the use of personal experiences as a subject of inquiry.



Heisook Kim



Miho Mitsunari



Emiko Ochiai



Minako Saigo

# An Asian Humanities, for the future

アジア人文学とは、従来の枠に捉われずに「アジア」について論じたり、「アジア」の視点から新たな世界観や人間観を発信する学問です！



パート1  
「京都学派の過去・現在・未来」

京都からの視線と  
英語圏～西洋からの視線を交差させ  
「世界哲学 (World Philosophy)」の  
一つのモデルとしての  
京都学派の立ち位置と課題と可能性を  
明らかにします。

**藤田正勝**  
京都大学名誉教授

**Thomas Kasulis**  
オハイオ州立大学  
名誉教授

パート2  
「世界の中の京大東洋学」

「京大東洋史」の研究が  
世界の学界で  
いかに継承されつつあるかを  
中国の研究者との  
対話を通じて考えます。

**礪波護**  
京都大学名誉教授

**林曉光**  
浙江大学  
人文学院副教授

パート3  
「フィールド人文学の可能性」

京都で培われてきた  
京大の文系・理系フィールド学を  
代表する二人の研究者の語りから  
新たな人文学の方向性を模索します。

**田中雅一**  
人文科学研究所教授

**山極壽一**  
京都大学総長

「異なる分野からの視線」で  
見つめることにより  
京大のアジア人文学の姿が  
立体的に浮かび上がることでしょ！  
登壇者の対話にご期待ください！

登壇者全員による  
総合討議も  
あるんですね！



An exploration in manga form, by Science Manga Artist Hayanon @ [hayanon.jp](http://hayanon.jp)

The HSS Unit's First Symposium  
**The Future of an Asian Humanities**

So, what's this symposium all about, anyway?

Mysterious Prof Bear Hakkuma

We're looking back over the century-plus of KyotoU's *Asian Humanities* tradition, which we then critique in light of world circumstances in the present and in the context of the future, delivering this discourse to the world.

Yasuo Deguchi  
 HSS unit head and professor of philosophy

Kitarô Nishida, Hajime Tanabe, and Keiji Nishitani's

**Kyoto School of Philosophy**

Konan Naitô and Ichisada Miyazaki's  
**Oriental History**

So now it is up to us to look at the issues humanity faces today and contemplate the future of our *Asian Humanities*!

Kinji Imanishi and Tadao Umésao's  
**Field Research**

The future!

**Part 1**  
**The Kyoto School**  
 — Past, Present, and Future

Examining the potential and the challenges of melding perspectives from Kyoto and the West into a possible model for a "World Philosophy".

**Masakatsu Fujita**  
 Professor Emeritus of KyotoU

**Thomas Kasulis**  
 Professor Emeritus of Ohio State University

**Part 2**  
**KyotoU's Oriental History**  
 and its Place in the World

Discussing how KyotoU's approach has been inherited by scholars worldwide.

**Mamoru Tonami**  
 Professor Emeritus of KyotoU

**Xiaoguang Lin**  
 Associate Professor of the Zhejiang University School of Humanities

**Part 3**  
**The Potential for a Field Humanities**

Examining the art and science of research in the field as cultivated at KyotoU, and discussing future directions for the humanities.

**Masakazu Tanaka**  
 Professor of KyotoU's Institute for Research in Humanities

**Juichi Yamagiwa**  
 President of Kyoto University

By observing KyotoU's academic traditions from different perspectives, we are sure to gain a vividly three-dimensional view of our Asian Humanities. The discourse among our speakers will be a site to behold!

"Kyô" for Kyoto and KyotoU

And the finale will be a discussion among all of the speakers!

## A petrifying virus key to evolution

**S**cientists are constantly discovering new species, but not always in nice places.

Now a research team of scientists from Kyoto University, Tokyo University of Science, Japan's National Institute for Physiological Sciences, and Tokyo Institute of Technology report on the Medusavirus, a unique giant that gives pause to current theory on viral evolution.

The Medusavirus is so named for the effect it has on its host amoeba, *Acanthamoeba castellanii*. Once infected, the amoeba forms cysts in a process known as 'encystment'. This is a typical response to a hostile environment and leaves the amoeba with a hard, protective — almost

stone-like — covering. Perhaps it was no surprise, then, that Medusavirus was found in hot springs in northern Japan: the first giant virus to have been isolated from a heated environment.

Along with the location of its discovery, Medusavirus has a number of distinguishing features that set it apart from other 'giant' viruses. Its DNA codes for all five types of histones, the key proteins that help compact DNA molecules within the nucleus. In fact, no other known virus has all five. Further, Medusavirus encoded neither RNA polymerase nor DNA topoisomerase II, whereas all other giant viruses encode at least one.

These features could explain why the replication of



Medusavirus DNA begins and completes in the host nucleus, eventually filling the amoeba nucleus with viral DNA, which again is unique.

Moreover, the capsid — protective shell — surface is uniquely covered with an extraordinary number of spherical-headed spikes. Not surprisingly, the amoeba genome encoded several capsid surface proteins.

The existence of histone genes in Medusavirus and capsid protein genes in the amoeba suggest lateral gene transfer going both directions: host-to-virus and virus-to-host.

Overall, the findings — appearing in the *Journal of Virology* — suggest that Medusavirus represents a new family of large DNA viruses that offers a new model for host-virus co-evolution. ■



## Let there be light-activated genes

**W**hile each cell in your body generally contains the same DNA, whether that cell is in

the skin on your nose or in a leg muscle depends on how its genes have been deciphered. This so-called

'gene expression' is a complex mechanism that adjusts dynamically depending on each cell's ultimate shape and function.

For some time now, researchers have had tools to artificially turn specific genes 'on' or 'off' at will.

And now, a team from Kyoto University's Graduate School of Biostudies have increased the precision of one tool by combining two well-established gene manipulation technologies: the 'Tetracycline-controlled transcriptional activation —

Tet — system' and the 'light-activated protein interaction system'.

"Many researchers have developed tools that activate genes in different ways. Some are based on proteins that change shape when they are stimulated by light illumination," explains first author Mayumi Yamada, who published the study in *Cell Reports*.

"Once the protein shape has changed, it will attach to a specific part of a cell's DNA and then begin the process of expressing a gene to make a protein."

# Infertility's roots in DNA packaging

**P**athological infertility is a condition affecting roughly 7% of human males, and among these cases, 10–15% are thought to have a genetic cause. However, pinpointing the precise genes responsible for the condition has been difficult, due to the extensive number involved in generating and developing sperm cells.

In a paper appearing in *Science Signaling*, a Japanese team reports unravelling the mechanism behind one cause of infertility — incomplete development of the proteins packaging DNA in sperm cells — and further, success in making test mice fertile by replacing a single amino acid on a key protein.

In every cell, thread-like DNA is wound tightly in the nucleus around bobbin-like proteins called 'histones'. And

in sperm cells — the smallest humans produce — another protein called 'protamine' is needed to wind the strands even tighter.

"It's been known for about 30 years that protamines are modified and matured during sperm development to enable proper functioning," explains first author Katsuhiko Itoh from Kyoto University's Graduate School of Medicine.

"This prompted us to disclose the underlying mechanism and biological consequences of protamine regulation, so that we can see how this process contributes to 'spermatogenesis' — the making sperm cells."

The team focused on a series of chaperones: proteins that assist in processing other proteins. Detailed genetic analysis revealed that a chaperone known as Hspa41 is

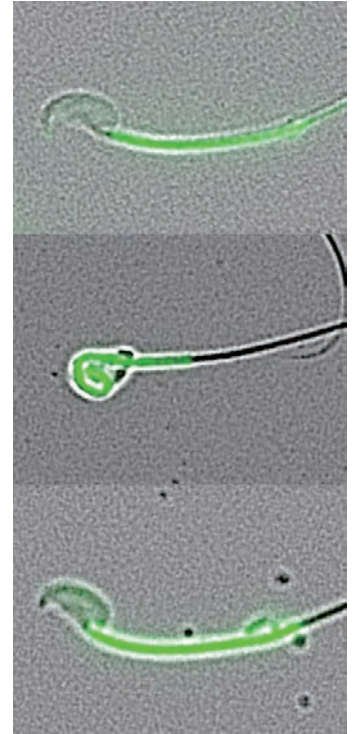
key to proper sperm cell development, and that its dysfunction has consequences similar to deficiency in a gene called *Ppp1cc2*.

"Further study showed that Hspa41 is vital for the proper functioning of phosphatase *Ppp1cc2*, a protein regulator," continues Itoh. "A dysfunction in Hspa41 stops *Ppp1cc2* from reaching chromatin, resulting in failure to dephosphorylate protamine 2 at serine 56, and with protamine 2 not functioning, sperm cells don't develop."

With these data, the team produced a mouse in which serine 56 was substituted to alanine, dephosphomimetic of dephosphorylated serine: the single amino acid replacement that made all the difference.

When combined with a mutation resulting in non-functioning Hspa41, the mouse showed no dysfunction in spermatogenesis, effectively preserving fertility.

Itoh emphasizes that his team's research shows the value in studying protamine



modification in the process of sperm cell maturation. The group hopes to further unravel the complex network of gene interaction and protein modification in spermatogenesis, and its further implications for infertility. ■

For mammalian cells, the Tet system is one such common, chemically-regulated system that can activate specific genes. It utilizes a small molecule called Doxycyclin — or Dox — to move the Tet transcription activator on or off of the DNA, thereby controlling gene expression.

Alternatively, light sensitive proteins — that change shape in response to particular wavelengths — have been used to activate genes in yeast. Their efficiency in mammalian cells is low, however, and even

the Tet system is not perfect, due to the difficulty of fine spatio-temporal regulation, clouding results.

"These drawbacks can limit the accuracy of our data," continues Yamada, "because with Tet we can't turn a gene on and then immediately off again since Dox is still present."

"Realizing this, our team came upon the idea of controlling the Tet system using light, to make a 'Photo-Activated Tet transcription activator', or PA-Tet."

The researchers took the key elements of both protein

tools and designed them to bind together in the presence of blue light, resulting in two versions of PA-Tet: PA-Tet-ON and PA-Tet-OFF.

In the former, the Tet element activates with Dox, but when the light is switched off, the protein complex splits apart and ceases all activity.

This new tool was shown to increase or decrease activity depending on the concentration of Dox as well as due to light intensity, and even short bursts of light could pulse gene expression levels.

"We can now accurately control gene expression inside a living mouse's body, such as in the brain and under the skin," states Yamada.

Lead researcher Itaru Imayoshi concludes, "Our lab's main focus is neural development and regeneration of the brain. Neural stem cells show dynamic changes in gene expression in a precise and timed manner. This PA-Tet system will help not only our field of research but the wider study of genetics and cell biology." ■

# Prince Charming's kiss unlocking brain's regenerative potential?



**T**he human body has powerful healing abilities. But treating brain disorders is no easy task, as brain cells — neurons — have limited ability to regenerate. Nonetheless, stem cells are a form of natural backup, a vestige of our days as still-developing embryos.

The difficulty is that, as we age, our brains' stem cells 'fall asleep' and become harder to wake up when repairs are needed. Despite efforts to harness these cells to treat neurological damage, scientists have until recently been unsuccessful in decoding the underlying 'sleep' mechanism.

Now, researchers at Kyoto University studying brain chemistry in mice have revealed the ebb and flow of gene expression that may wake neural stem cells from

their slumber. These findings, which may also apply to stem cells elsewhere in the body, appeared in the journal *Genes & Development*.

"No one before us has directly compared active stem cells in embryos with inactive, 'quiescent' adult stem cells," says group leader Ryoichiro Kageyama of KyotoU's Institute for Frontier Life and Medical Sciences, who points out that at least two genes and their associated proteins regulating activation had already been identified.

The team focused their attention on protein 'Hes1', which is strongly expressed in the adult cells. This normally suppresses the production of other proteins such as 'Ascl1', small amounts of which are periodically produced by active stem cells.

# Chimps caught crabbing

**W**hy do we fish? At some point eons ago, our primarily fruit-eating ancestors put their hands in the water to catch and eat aquatic life, inadvertently supplementing their diet with nutrients that initiated a brain development process that eventually led to us. But how did this begin?

Now, according to a research team from Kyoto University, one potential clue may have surfaced thanks to observations of our closest genetic relatives: chimpanzees. The scientists report the first ever evidence of wild chimps

habitually catching and consuming freshwater crabs.

Writing in the *Journal of Human Evolution*, the team describes year-round, fresh water crab-fishing behavior — primarily among female and infant chimpanzees — living in the rainforest of the Nimba Mountains in Guinea, West Africa.

"The aquatic fauna our ancestors consumed likely provided essential long-chain polyunsaturated fatty acids, required for optimal brain growth and function," explains first author Kathelijne Koops from the University of Zurich

and Kyoto University's Leading Graduate Program in Primatology and Wildlife Science.

"Further, our findings suggest that aquatic fauna may have been a regular part of hominins' diets and not just a seasonal fallback food."

The study began in 2012 when the researchers first observed the chimpanzees fishing for crabs. For two years, they documented the demographics and behavior of these chimps, while also analyzing and comparing the nutritional value of the crabs to other foods in the chimpanzees' diet.

Crabbing, they learned, not only took place year-round — without regard to season or fruit availability — but intriguingly was negatively correlated with the chimps' consumption of ants, another diet staple. Mature males were the least likely to consume aquatic fauna.

"Energy and sodium levels in large crabs are comparative with ants," explains Koops, "leading us to hypothesize that crabs may be an important year-round source of protein and salts for females — especially when pregnant or nursing — and for growing juveniles."

The study further sheds light on our own evolution, by showing that fishing

Monitoring the production of the two proteins over time, the team pinpointed a wave-like pattern that leads to stem cells waking up and turning into neurons in the brain.

When they ‘knocked out’ the genetic code needed to make *Hes1*, the cells started to make more *Ascl1*, which then activated almost all the neural stem cells.

“It is key that the same genes are responsible for both the active and quiescent states of these stem cells,” Kageyama adds. “Only the expression dynamics differ between the two.”

“A better understanding of the regulatory mechanisms of these different expression dynamics could allow us to switch the dormant cells on as part of a treatment for a range of neurological disorders.” ■



## A study in scarlet Japanese macaques

**F**rom peacocks to butterflies, nature typically doesn’t disappoint when it colors the males of a species, which — in the case of traditional sex roles — are expected to compete for mates, resulting in the males evolving flashier ornamentation.

Coloration also occurs in many primates, if not for the same reason. For example, the faces and hindquarters of male and female Japanese macaques have been observed to change color according to season. But in a study published in *Behavioral Ecology and Sociobiology*, a team from KyotoU’s Primate Research Institute propose that female red skin color acts as a ‘badge’ of social status and not — as previously thought — of fertility.

First author Lucie Rigaiil explains that while female primates display colorful traits, little is actually known about the role such features play in mating.

Previous studies in other primates, such as rhesus macaques and mandrills, have shown a link between red skin color variation and ovulation or fertility. Female Japanese macaques have also been observed to acquire ‘redder faces’, linked to variation in sex hormone levels, leading researchers to assume that darker or redder faces are a sign of mating availability.

To test this assumption, the team recorded face and hindquarter coloration along with hormone levels of selected female macaques during the winter mating season.

“Contrary to what we originally thought, changes in female skin color did not actually indicate the ovulation period. Skin color did not correlate with fertility either,” explains Rigaiil.

“Further, females of higher social status had darker or redder hindquarters, something until now only reported in male primate populations.”

Altogether, female red skin color may play a more complex role in Japanese macaques than previously thought, and in fact possibly more involved in signaling social attributes rather than fertility.

Rigaiil continues, “Intriguingly, females don’t show precise behavioral or coloration changes until the beginning of pregnancy, outlining a larger picture of the sexual signaling in this species: females seem to conceal ovulation but signal pregnancy.”

The team is excited to have more evidence that mate choice, sexual competition, and mating strategies are dynamic and expressed by both sexes. The scientists are therefore looking to expand their understanding of the evolution of sexual communication in other primate species, eventually leading to humans. ■



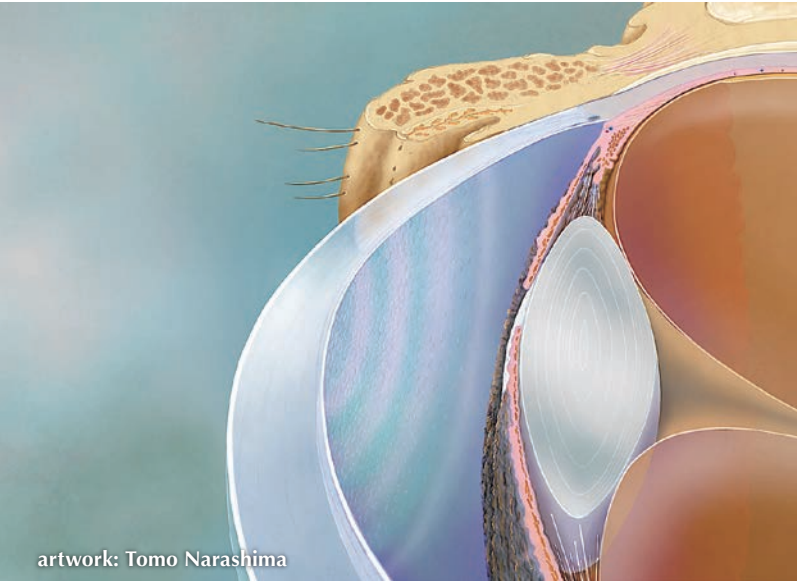
behaviors may not be restricted by habitat as initially assumed.

“This isn’t the first case of non-human primates eating crabs,” points out senior co-author Tetsuro Matsuzawa, “but it is the first evidence of apes other than humans doing so. Notably, previous observations were from

monkey species in locations consistent with aquatic faunivory — lakes, rivers, or coastlines — and not in closed rainforest.”

“It’s exciting to see a behavior like this that allows us to improve our understanding of what drove our ancestors to diversify their diet.” ■

## Testing corneal cell quality? Apply physics



artwork: Tomo Narashima

**O**ur eyes — the windows to the soul — need constant care, and as we age, they sometimes also need significant repair.

The panes of these windows — the corneas — are transparent tissues that have been the focus of some of the oldest and most common transplantation surgeries. Now thanks to researchers in Kyoto, some such transplants may become even safer.

The team, led by KyotoU physicists and Kyoto Prefectural University of Medicine (KPUM) ophthalmologists, has developed a ‘quantitative biomarker’ that makes it possible to assess the quality of corneal cells — and even predict their long-term efficacy — through simple observation. A report on their findings appeared in *Nature Biomedical Engineering*.

“Cornea transplantations become necessary when ‘corneal endothelial cells’ decrease in number, resulting in haziness,” explains project leader Motomu Tanaka.

Endothelia don’t multiply well in the human body, which is why there has been a need to rely on the transplantation of donor corneas for treatment. Fortunately, in 2009 a team of

ophthalmologists at KPUM succeeded in developing a method to culture the cells in a dish.

“These new cells could then be transplanted into the eyes of patients and restore their corneas to health,” says KPUM’s Morio Ueno.

This method has shown significant promise in clinical trials, but two major obstacles to wider application remain: quality control of cells before injection and confirmation of long-term functionality.

Typically, cell quality is assessed through protein expression patterns via ‘flow cytometry’. However, a single test requires almost 100,000 cells and relies heavily on the observations and experience of senior professionals.

“Cells in a tissue are constantly interacting with each other to maintain a steady state, called homeostasis,” explains first author Akihisa Yamamoto, adding that the concept of

‘colloid physics’ — a method for measuring interactions of micro- and nanoparticles — was employed to assess the cornea cells.

“Calculating the interactions between all cells in the cornea allowed us to find the ‘spring constant’, correlating with collective cell order.”

Assessment is relatively simple. Researchers only need to extract the ‘rims’ of the cells, either from a microscopic image of the cells in a culture dish or from ophthalmological inspection images of the patients’ eyes. Both the quality of the cells and their long-term efficacy can be determined with just one equation.

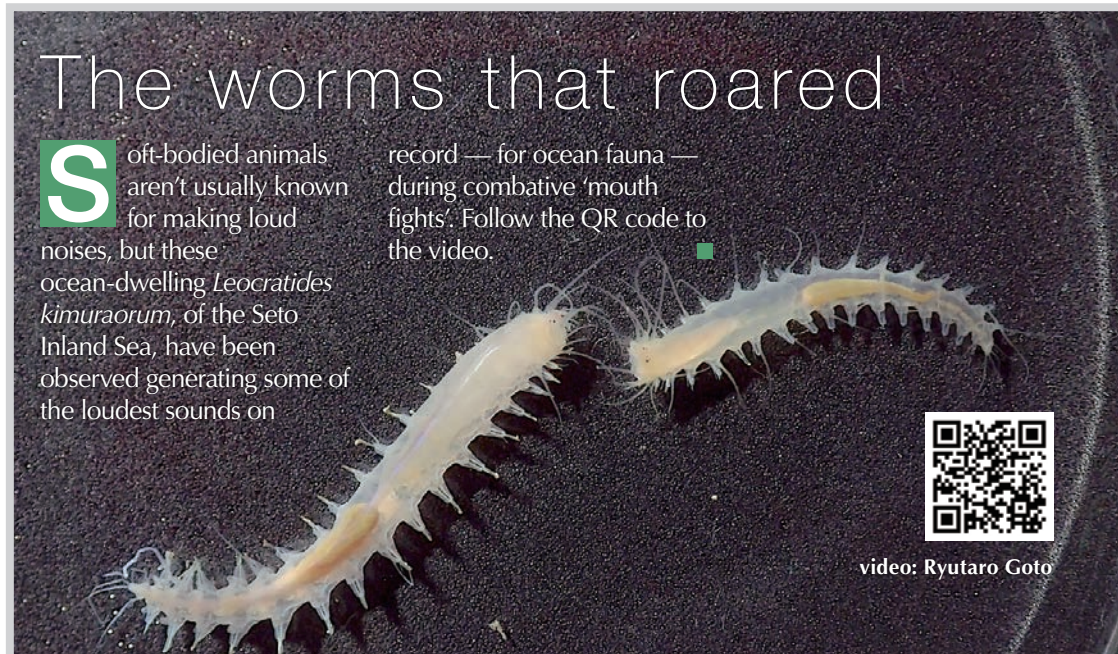
The procedure has potential applications in preemptive medicine, enabling clinicians and doctors to intervene before more severe symptoms appear.

“Our results are thanks to the united effort of physicists and doctors engaged in regenerative medicine,” concludes Tanaka. “We foresee that our ‘quantitative biomarker’, and the concept behind it, will be applied to other epithelial cell cultures and tissues in the future.” ■

## The worms that roared

**S**oft-bodied animals aren’t usually known for making loud noises, but these ocean-dwelling *Leocratides kimuraorum*, of the Seto Inland Sea, have been observed generating some of the loudest sounds on

record — for ocean fauna — during combative ‘mouth fights’. Follow the QR code to the video. ■



video: Ryutaro Goto

Kyoto University spans three campuses in the city of Kyoto, numerous offices, research facilities, and other operations around the country, and dozens of centers, liaison offices, and field stations across the globe. In this third section, learn of some of the latest developments from the forefronts of research, overseas offices and labs, and student life.



**So tell us... what do you do and how did you get to Japan?**

## “How do chimpanzees and humans perceive bodies?”

### Jie Gao

PhD Candidate and JSPS DC1 Fellow, Graduate School of Science  
[www.cicasp.pri.kyoto-u.ac.jp/people/jie-gao](http://www.cicasp.pri.kyoto-u.ac.jp/people/jie-gao)

Originally from China. First came to KyotoU in 2014 as a student intern. Started master course from 2015 and then doctoral from 2017. Current recipient of a DC1 Research Fellowship from JSPS, and by KyotoU's Leading Graduate Program in Primatology and Wildlife Science.



## “What multidisciplinary lessons can we learn from the study of Southeast Asia?”

### Mario Lopez

Associate Professor, Center for Southeast Asian Studies (CSEAS)  
[en.kyoto.cseas.kyoto-u.ac.jp/about/staff-page/lopez-mario-ivan/](http://en.kyoto.cseas.kyoto-u.ac.jp/about/staff-page/lopez-mario-ivan/)

Originally from the United Kingdom. Came to KyotoU in 2009 as an assistant professor. Associate Professor as of 2014. Current recipient of funding from the Japan-ASEAN platform for transdisciplinary humanosphere research, and also Kakenhi *Kiban B* from JSPS.

## “What does cinema teach us about our society and ourselves?”

### Mitsuyo Wada-Marciano

Professor of cinema, media studies, and transcultural studies, Graduate School of Letters  
[www.cats.bun.kyoto-u.ac.jp/jdts/team/academic-staff/mitsuyo-wada-marciano/](http://www.cats.bun.kyoto-u.ac.jp/jdts/team/academic-staff/mitsuyo-wada-marciano/)

Born in Japan and educated in both Japan and the United States. KyotoU professor from July 2018. Author of numerous books and studies on Japanese and Asian cinema from their advent in the 1920s through the post 3.11/Fukushima disaster period. Current recipient of funding from the Kyoto University Foundation.



JSPS = Japan Society for the Promotion of Science  
Kakenhi Kiban = Grant-in-Aid for Scientific Research (A, B, or C)



### Bangkok ASEAN Center

This April the ASEAN Center welcomed Eiji Nawata — former dean of the Graduate School of Agriculture and a specialist in tropical agriculture — as its new Director. With deep experience leading education and research collaboration programs throughout the region, Nawata is committed to building constructive and sustainable relationships with universities and academic institutions across ASEAN, as well as supporting the extensive work of students and colleagues at the Center.

KyotoU researchers have conducted diverse and thorough fieldwork in the region since the 1960s, ranging from the natural sciences to the humanities and social sciences. Former Center Director Shibayama, for example, pioneered the use of informatics in the study of ancient heritage sites by applying GIS and remote sensing technologies, which inspired a generation of scientists across borders and disciplines.

Throughout the region, interest is growing steadily in HSS at KyotoU, as



demonstrated by an increase of inquiries from prospective students related to economics and Asian studies. This is good news for the University's new HSS unit (described earlier), which welcomes

graduate students and researchers to explore trans-disciplinary areas that add value to a new vision of an Asian and field humanities.

### Heidelberg European Center

The international conference "Does Nature Think?" was held in Paris 6–8 June, organized by UNESCO, the Research Institute for Humanity and Nature, École Nationale Supérieure des Mines de Paris, EHESS, Maison de la Culture du

Japan à Paris, and KyotoU. The central question of the meeting — its title — was raised by French Japanologist Augustin Berque. His critique of modern Western ascription of transcendental status to humans framed the discussions of non-human

self-awareness and communication.

Seven KyotoU researchers representing the fields of philosophy, primatology, Western art history, anthropology, and agricultural science gave presentations, with President Yamagiwa speaking on the last day on "Japanese Concepts on the World Living Things". Yamagiwa

explained how the Japanese principle of blank space — *aida*, in between — is imbued with meaning and can be used to explain the relationship between humans and nature.

Situated similarly 'in between', the European Center sees its key mission as acting as a bridge between the value systems of Japan and Europe.

### Washington North American Center

A long tradition of academic exchange in HSS fields exists between KyotoU and North American institutions, built upon linkages among

individual scholars working together across linguistic, cultural, and historical boundaries, jointly seeking a truly 'human' interpretation

and representation of society.

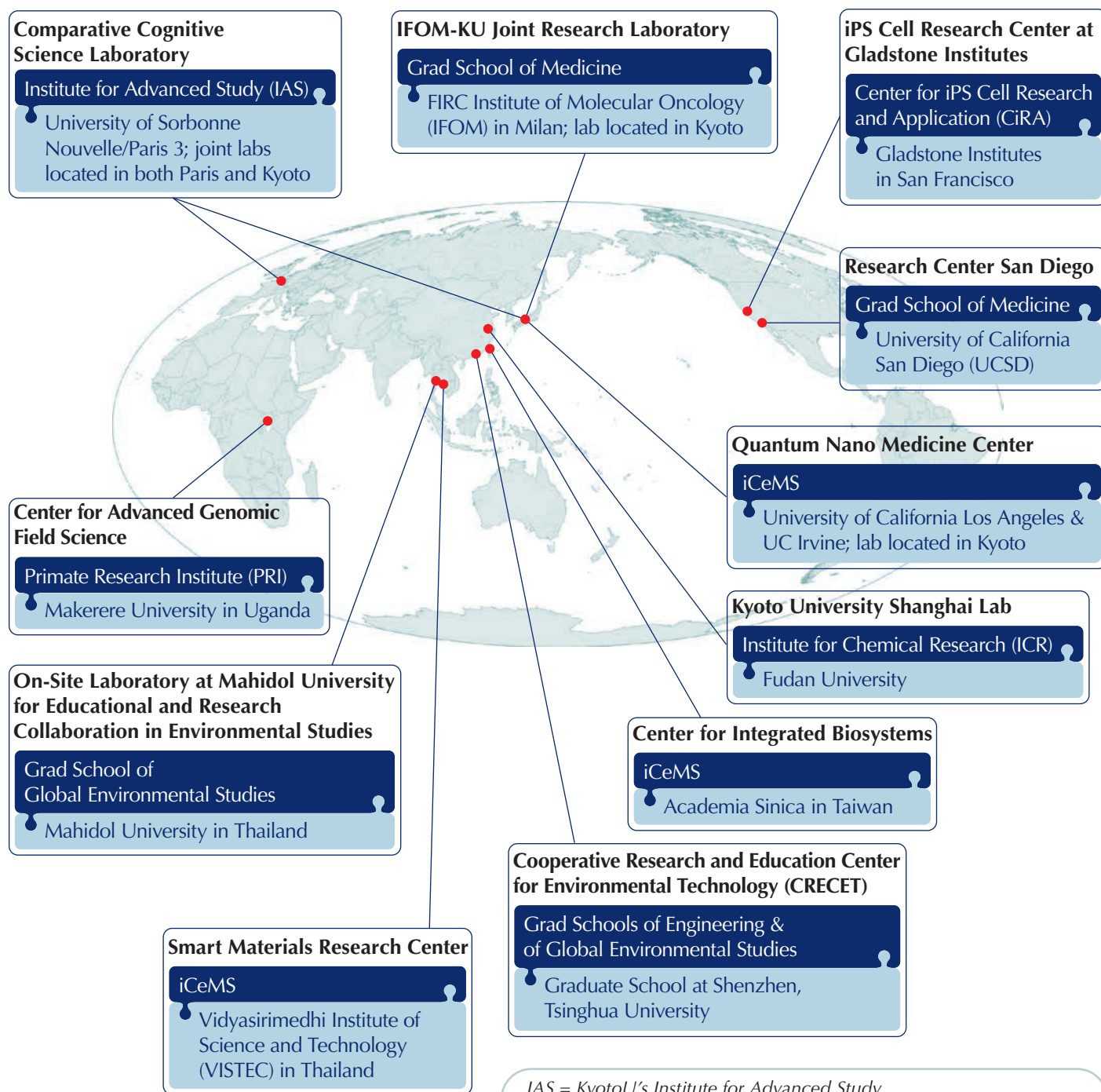
The North American Center supports facilitating and publicizing the innovative research coming out of KyotoU, and is excited by the initiative of the HSS unit to publish a book series on an Asian humanities,

which will undoubtedly contribute to cross-cultural exchange within fields of study in the humanities, as well as lend an added dimension to study of today's technology-centric age of personalized medicine, social media, and artificial intelligence.



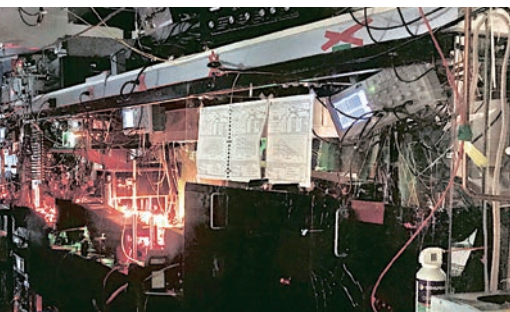
## On-Site Laboratory network established

In December 2018, Kyoto University began rollout of a global network of “On-Site Labs” as envisioned in its Designated National University proposal. These eleven already operational or soon-to-open facilities are managed jointly by KyotoU grad schools and centers together with partner universities and institutes overseas, facilitating cutting-edge science, staff mobility, and the strengthening of collaboration with industry.



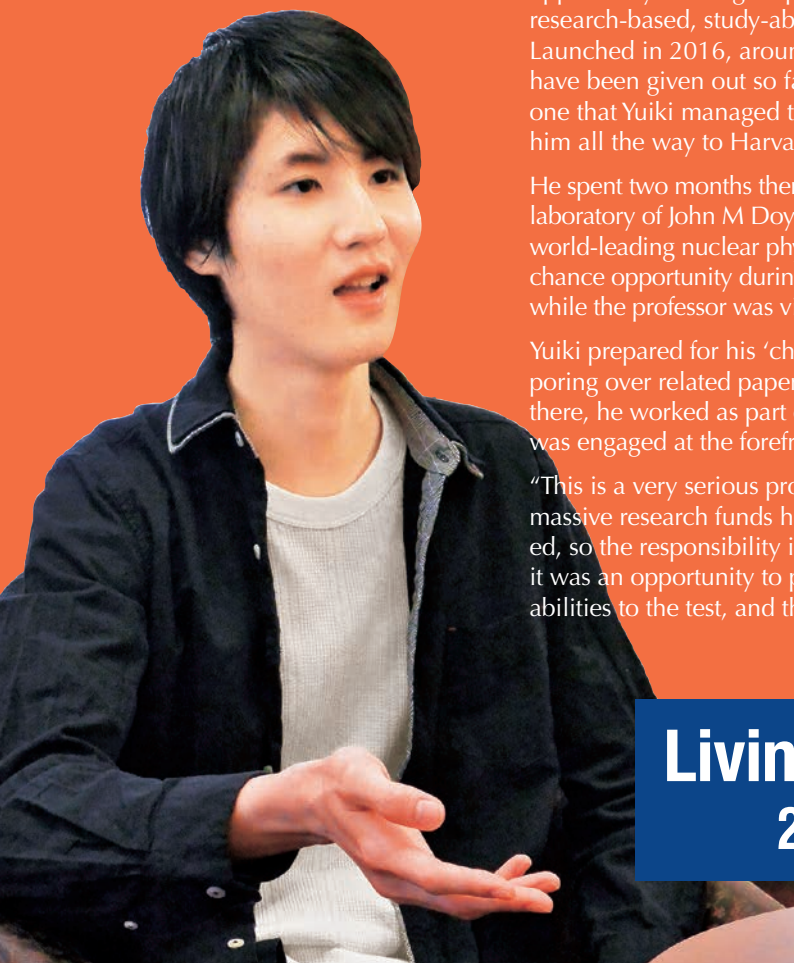
IAS = KyotoU's Institute for Advanced Study  
 iCeMS = the Institute for Integrated Cell-Material Sciences at IAS  
 FIRC = the Italian Foundation for Cancer Research





Particle physics is often studied in large facilities such as at UTokyo's Super-Kamiokande, but with recent advances it is now possible to conduct many experiments with lab-sized apparatuses. The measurement precision of the Doyle Lab's project is among the highest in the world.

Yuiki with friends from Harvard's Japan Society. He has maintained contact with them and meets them regularly.



"A study of the quantum-level control and measurement of ultra-cold molecules and their ground-breaking applications in particle physics."

Knowing that his report's title is a mouthful, Yuiki Takahashi says, "It's got to be the least *omoro* title of all of the Omoro Challenge applications. But I won't lose to anyone on the *omoro*-ness of the content."

The University-sponsored 'Omoro Challenge' — *omoro* being the Kansai dialect variant of *omoshiroi* for something that is 'interesting/curiosity inducing' — gives selected undergraduates the opportunity to design a personalized, research-based, study-abroad program. Launched in 2016, around 100 grants have been given out so far, including the one that Yuiki managed to secure to take him all the way to Harvard University.

He spent two months there in the laboratory of John M Doyle, a world-leading nuclear physicist, following a chance opportunity during a lunch meeting while the professor was visiting Japan.

Yuiki prepared for his 'challenge' trip by poring over related papers. And then while there, he worked as part of a team that was engaged at the forefront of the field.

"This is a very serious project, into which massive research funds have been invested, so the responsibility is huge. I realized it was an opportunity to put my true abilities to the test, and the fact that I was

able to leave behind concrete results was a significant achievement for me."

Before returning to Kyoto, he even managed to secure a promise from the California Institute of Technology for a new overseas research trip: a wonderful souvenir to cap off a visit to America that was full of highs.

While he might seem like the type to immediately leap into action as soon as an idea comes to him, Yuiki is actually surprisingly meticulous in this planning.

"I always want to go where I can grow the most, and stand at the very front in order to be the first to see the scenery up ahead. I want to use physics to answer the question of how the universe began: not just in theory, but as an experimentalist who seeks new phenomena and verifies existing theories through rigorous data collection. The challenges I have taken on so far have given me a real, first-hand sense of what life is like at the cutting edge of the world."

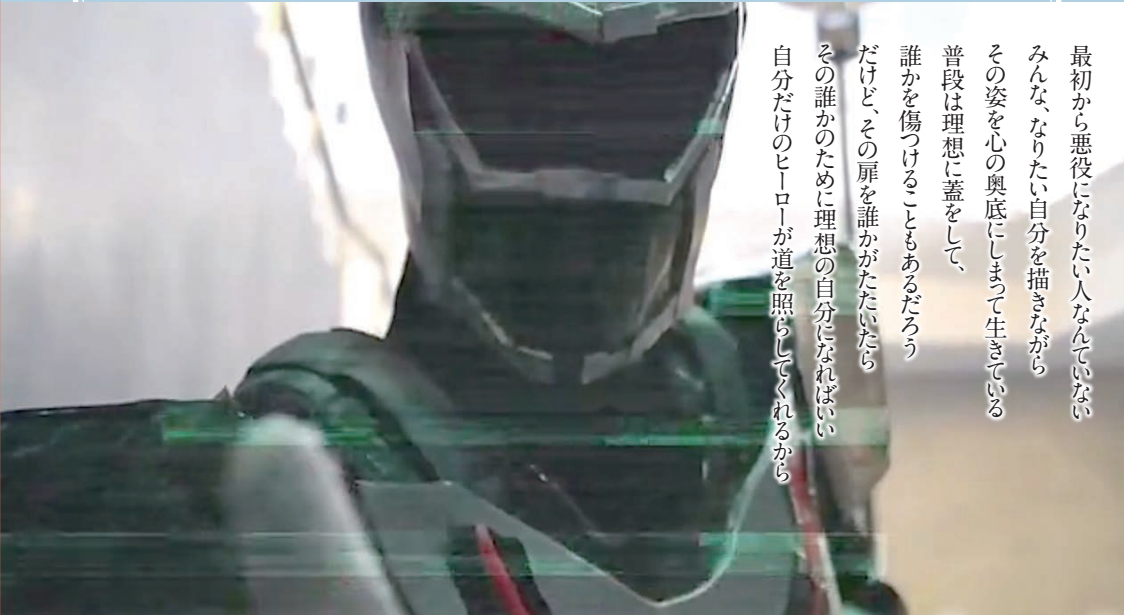
Now attending graduate school at the University of Tokyo, Yuiki says of the future, "I realize that just talking about my dreams won't pay the bills, but if I want to solve the mysteries of physics, devoting my life to these experiments is the least I can do."

And with his direct gaze and frank words, he may some day actually discover some new and wondrous fragment of the universe.

## Living life on the *omoro* edge 2017 Omoro Challenge recipient

Yuiki Takahashi (Faculty of Science alumnus)

Artwork by Kyoto University students, combined with artistic scenes as glimpsed by researchers.



最初から悪役になりたい人なんていない  
みんな、なりたい自分を描きながら  
その姿を心の奥底にしまつて生きてる  
普段は理想に蓋をして、  
誰かを傷つけることもあるだろう  
だけど、その扉を誰かがたたいたら  
その誰かのために理想の自分になればいい  
自分だけのヒーローが道を照らしてくれるから

# A Fund to help us grow

Since its founding in 1897, Kyoto University has been committed to a spirit of openness and academic freedom that pervades all levels of academic life, from freshman courses to research in world-leading laboratories.

Protecting and promoting this freedom, and encouraging students to reach even further, is the highest goal of the institution.

The Kyoto University Fund provides an avenue for university stakeholders — from members of the local community to businesses and corporate sponsors — to support these students, their efforts, and their learning and study environment. In addition to a main, central fund, special-purpose funds are targeted toward particular activities and fields of research.

One example is the SPEC (Student Projects for Enhancing Creativity) fund, in which student r&d projects selected through a contest received development funding.

Making dreams a reality for students and researchers throughout the institution: this is what the Fund makes possible.

For details on types and levels of support, as well as payment methods, please see the website below. Your generous support of the university is most greatly appreciated.

**Kyoto University Fund**

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en.kikin.kyoto-u.ac.jp



## “Like a Hero” Kyoto Tokusatsu Project

Since childhood, a young man has had a dream. Facing the ugliness of adult greed, he trembles with a sense of justice, rising up against them and grasping immense strength. The power of dreams and the tragedy accompanying them: where do these lead him?

“What is true justice?”

The young man, having now destroyed everything, looks up and sees the hero he had once yearned to become.

おと



### Yoshida Music Works

**Yuta Ueno** (4th Year, Faculty of Engineering)

#### Title: Turntable

Going home after a long day, an old friend suddenly comes to mind, filling me with nostalgia. The floor of the Chinese restaurant I drop into is a bit greasy, as is often the case. Inspired by this scene, mixing warmth and melancholy, I selected this piece of music.

*No one chooses to be a villain from the beginning  
We all imagine what we want to become when we grow up,  
But lock this image away in our heart of hearts  
We usually keep our ideals a secret,  
Sometimes we may hurt others  
But if someone knocks on our heart's door  
We can be our ideal self for that someone  
A hero of our very own will light our way*

### Yukidaruma Production

**Ayane Seike** (1st Year, Faculty of Letters)

What is a hero to you? Perhaps it is the lead character of a sci-fi movie or cartoon you saw as a child. But those are all “heroes” of our memories. The ideal hero lies inside each individual’s heart. The music made me feel nostalgic, but also somehow urged me to take a step forward to describe the gap between my ideal self and reality, and the path I will take to reach that ideal.

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