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Kobe University Newsletter "Kaze"

Vol. 10

April 2021

SPOTLIGHT

Redefining the role of universities in the COVID-19 era

RESEARCH AT KOBE

Expanding horizons of insect ecology research

STUDENT FEATURE

Giving children the opportunity to observe the stars

The Roy Smith House



The Roy Smith House is situated about 1.3km to the west of the Administrative Offices of Kobe University. It is located in a hilly, quiet residential area of Kobe up near the mountains.

It was built in 1935 as the residence of the trader OTANI Shigeru. It is a two-storey house with a Spanish-style tiled roof and a light, contemporary interior. SHIMIZU Eiji, the architect in charge of the house's design, is known for other buildings in the Kobe area such as Mikage Public Hall and Kōnanzuke Shiryōkan (Former Takashima Residence).



From the outside, it has a western appearance with half-timbering and triple windows. Inside it features stained glass with nautical motifs, such as ships with sails, which reflect its location in the international port city of Kobe. On the south side of the house is a beautiful Japanese-style garden.

After World War II, the house was used as the Canadian Academy's girls' dormitory before becoming the home of Roy Smith, an invited professor at Kobe University, in 1960. It is currently the office of the Kobe University Rokkodai Foundation. The house became a registered tangible cultural property in October 2011.

Roy Smith, whom the house is named after, was born in Illinois, USA in June 1878. He attained a B.A. (Bachelor of Arts) from the University of Illinois, a M. C. S. (Master of Commercial Science) from New York University, and a M. Ph. (Master of Philosophy) from The University of Chicago. In 1909 at the age of 31, he took up a position at Kobe Higher Commercial School (now Kobe University). Although he returned to America for a brief period during the Pacific War, he taught at Kobe University until 1968 when he was 89, becoming the first non-Japanese Professor Emeritus at the university. His teaching career at Kobe University spanned over half a century and he remains the longest serving professor in the university's history. In 1960, many of Professor Smith's former students banded together to buy the former Otani Residence and held a naming ceremony and party on November 21 of that year on which the house was given its current name: 'The Roy Smith House'. Professor Smith lived in the house for his last 8 years in Japan before he retired and went back to America, where he passed away in June 1969.

Even today, you can see evidence of the fondness and regard that Kobe University students had for Professor Emeritus Smith. The bust of Professor Smith that can be found in the garden in front of the Rokkodai Main Building and the large mural by NAKAYAMA Masami in the Library for Social Sciences were funded by donations from Professor Smith's former students.

(The original Japanese version of this article was written by NOMURA Rieko, deputy head of the Kobe University Archives.)

The Roy Smith House is located at: Shinohara Kitamachi 4-11-5 Nada, Kobe, Japan.

Top left: Professor Emeritus Smith at a ceremony to mark 50 years of continuous employment at Kobe University.
Top right: The entrance hall.
Middle: The front of the house.
Bottom: The stained glass windows look out onto the Japanese-style garden.

Cover photo for Kobe University Magazine "Kaze" Issue 10:
The Research Center for Advanced Membrane and Film Technology on Rokko-dai 2nd Campus.

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Why "Kaze"?

There are two main concepts behind the title "Kaze", meaning "wind". Firstly, Kobe University's goal to innovate, creating a wind of change. Secondly, our location at the foot of Mt Rokkō, an area known for the invigorating wind of Rokkō-oroshi that blows down from the mountain range. The calligraphy on the cover of "Kaze" was created by Professor Emeritus UOZUMI Kazuaki, a researcher of calligraphy at Kobe University.

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(International Affairs Planning Division)

神戸大学



Redefining the role of universities in the COVID-19 era

A multidisciplinary approach to solving corona-related issues yields varied contributions



In the past year, the novel coronavirus (COVID-19) has become a worldwide pandemic and the spread of this virus is having a profound impact on Japanese society as well.

One of Kobe University's missions is to conduct research, surveys and other efforts into resolving corona-related issues in order to surmount the threats posed by this virus, and present and promote these results both domestically and abroad. The university has recognized that overcoming these difficult circumstances requires varied contributions that transcend the boundary between the sciences and humanities. Efforts to tackle the virus are not limited to the field of medicine but also include science and technology, humanities and social sciences, educational support and volunteer activities. There are currently over 50 projects underway at the university relating to the novel coronavirus including research and support efforts.

In July 2020, the 'Kobe University 'With COVID-19' symposium: Considering how society can coexist with novel coronavirus' was held. This online event introduced Kobe University's research and survey projects related to upcoming infection prevention policies. Subsequently, these projects surpassed the development stage

While remaining actively engaged with the current circumstances and needs of society, Kobe University is taking streamlined and decisive action across many areas in order to get projects past the developmental stage, accelerate research, expedite social implementation and set up educational support.

We interviewed Kobe University faculty from 4 academic areas (humanities and human sciences, social sciences, natural sciences, and life and medical sciences) to find out about the efforts being made in each field to tackle the novel coronavirus.

Research, surveys and other efforts regarding measures against the Novel Coronavirus (COVID-19)								
Treatment methods	Hospital Facilities	High speed/precision	Hygiene products	Prediction & Analysis	Economics	Health/Welfare	Policies/Surveys/Proposals	Information Dissemination
Replicon-based drug screening GS Health Sciences Kameoka/Kotaki	ICU establishment GS Medicine Yamanaka/Okada	Test kit platform GS Engineering Maruyama	New polyurethane materials GS Science Tsuda	Mathematical prediction model GS System Informatics Kuniya	Impact on household finances GS Human Dev. & Eniv. Tabata	Sitting time GS Health Sciences Izawa	Support for the Arts and Culture GS Intercultural Studies Fujino	Website for sharing academic information GS Health Sciences Nakazawa
Innate immunity/Inflammasome GS Health Sciences Komai	Triage AI GS Medicine Nakai	Monoclonal antibodies GS Medicine Funakoshi	Santizer provision School of Medicine Facilities Management Division Sasabe	Predicting virus dispersion GS System Informatics Tsubokura	Agricultural impact & value creation GS Agricultural Science Nakatsuka	Changes in Sleep/well-being GS Human Dev. & Eniv. Furutani	Comparing & proposing anti-coronavirus measures Center for Social Systems Innovation Kaneko	Microtourism: Supporting the tourism industry GS Intercultural Studies Karashima
Vaccines	Medical Devices/Instruments	Terahertz spectroscopy GS Engineering Kojima	Virus removal		Business	Supporting children with developmental disorders GS Human Dev. & Eniv. Yamane	Ethics related to infectious diseases Organization for Advanced & Integrated Research Matsuda	Staff/Student Care
Oral Vaccine GS Science, Technology & Innovation Shirakawa	Application of 3D Printers Clinical & Translational Research Center Kakei	Near infrared aquaphotomics GS Agricultural Science Tsenkova	System for exterminating airborne viruses Center for Mathematical & Data Sciences Kimura		The impact on consumer behavior and the use of contactless services GS Business Admin. Fujiwara	Dependence on online gaming GS Medicine Sora	Preventing dementia in the corona era GS Health Sciences Kido	Stress caused by environmental changes GS Medicine: Health Center Aoyama/Mouri
Immune response GS Science, Technology & Innovation Kitagawa					Managerial accounting & BCP GS Business Admin. Miya	Preventing dementia in the corona era GS Health Sciences Kido	Historical Perspective	Education/Educational Materials
					Psychological & behavioral impacts in the workplace RI Economics & Business Admin. Enatsu GS Business Admin. Hattori	Lifestyle changes	Comparative historical research on cities GS Humanities Okumura/Shiratori	Educational materials on infection rates GS Science Onishi
					Consortium of small to mid-sized industries V. School Kutsuna	Eating habits of single parents GS Agricultural Science Ishida		Lab classes with household ingredients GS Agricultural Science Uno
					Survey of organizations' responses GS Business Admin. Hattori	Risks facing the elderly GS Human Dev. & Eniv. Katagiri		Spatial Design Competition Graphics Literacy Education & Research Center Suzuki
						Foreigners' lifestyles GS Humanities Hirai		Considering university education in the corona era V. School Tamaki
						Actuality of behavior/lifestyle changes GS Human Dev. & Eniv. Aoki		Graduation research for secondary school students Kobe University Secondary School Former Principle Fujita
						Proposal for post-corona working practices GS Health Sciences Shiotani		
						Main factors & effects of 'stay home' on people's lives GS Health Sciences Ono		
Treatment/Vaccine Development	Policies to Prevent Healthcare System Collapse	Detection Technology	Infection Prevention	Data Science	Economics	Living	Academia	Within the University/ Others

Abbreviations Key: GS: Graduate School of • RI: Research Institute



Kobe University is tackling over 50 novel coronavirus-related research topics

From a Business Studies perspective

The importance of resilience comes to the fore during the pandemic

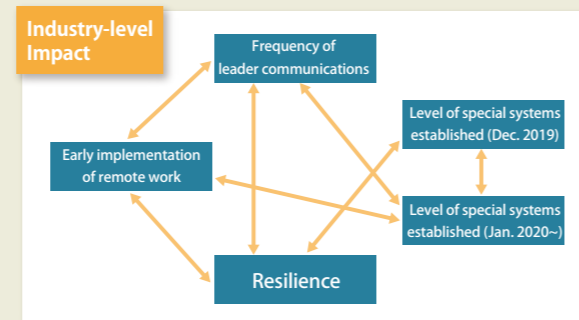
One of my main interests is the research area where psychology and business administration overlap. I am studying how human resource systems and the behavior of managers affect the attitudes and behavior of individuals in organizations.

I am currently involved in two projects relating to the novel coronavirus. The first is a survey project that looks at the psychological and behavioral effects of novel coronavirus-related restrictions on employees. The project leader is Professor ENATSU Ikutaro of Kobe University's Research Institute of Business Administration. This survey is conducted on an individual level (micro level); the same participants completed a questionnaire survey in April and August 2020 and we looked for any changes in their responses. I am leading the second project, which is the company level (macro level) survey.

What became apparent from these results was that there were differences between individuals (i.e. between individual people and between individual companies) in terms of the impact of the coronavirus. On an industry level, there were not only differences in the scale and type of industry but it was also found that companies that were quick to introduce remote work were likely to properly implement policies and advisory services. Companies that are taking steps against the virus are implementing varied measures, however in contrast to this; some companies are not taking any action at all. These differences depended on what kind of systems the company had set up pre-corona, as well as variations in the strength and flexibility of their organization and people; in other words, their resilience.



Associate Professor HATTORI Yasuhiro
Graduate School of Business Administration



Correlations were found between different coronavirus-related measures taken by companies, including remote work. In organizations that were quick to implement remote working, there was also a high level of communication from the leaders and special systems were set up. At the heart of this is resilience (the arrows indicate correlations).

The same trends can also be observed on an individual level. Individuals with neurotic tendencies and low self-confidence were more likely to be heavily impacted by the novel coronavirus and suffer from anxiety. In other words, there was a big difference in impact depending on the person's existing characteristics and personality. Resilience has become an important factor in the face of societal changes brought about by novel coronavirus.

Next, it is vital to begin the discussion on how to increase resilience. There are many possible ways that we can achieve this. For example, colleagues who share information about various non-work related topics with each other are able to maintain good working relationships even when work is conducted online. When work-related information overlaps with this so-called redundant or useless information, it is easier for employees to carry out their tasks. We believe that the presence or absence of this characteristic can affect not only individual productivity but could also be connected to firm-level productivity. Therefore, we should try to create this kind of workplace.

Ironically, the coronavirus has brought to light problems that existed beforehand but had remained unnoticed. We would like to find a positive side to these circumstances brought about by the coronavirus. One potential beneficial outcome is that it will be possible to improve resilience. As researchers, we would like to support real life decision-making based on our data.

From a Clinical Virology perspective

Illuminating the mechanism behind severe COVID-19 and developing control methods

-Conducting antibody tests on 10,000 people in Hyogo Prefecture-

In our laboratory, we are conducting research on herpesviruses. We have been striving to illuminate the molecular mechanisms through which these viruses cause illness and to develop ways to suppress it. Using our previous work as a basis, we have been researching the SARS-CoV-2 (which is a novel coronavirus) by analyzing clinical samples that we receive from hospitals.

First of all, we performed various analyses on blood samples from patients and found that their bodies had produced substances such as neutralizing antibodies and cytokines which cause inflammation. Furthermore, we revealed that neutralizing antibody levels were higher in patients with severe symptoms and that cytokine storms occur within such patients. We have also shown that it is vital for patients with severe symptoms to be treated with antiviral drugs in the early stage and anti-inflammatory drugs during the critical stage.

In addition, our research team conducted antibody tests on over 500 medical personnel working at hospitals treating patients with COVID-19, and found that all of them tested negative for antibodies (i.e., they had not been infected). This result confirms that hospitals' infection prevention standards are effective. In other words, we showed that when doctors, nurses and other medical staff thoroughly follow prevention measures, they can avoid catching the virus from patients. I believe that this will improve confidence in the safety of medical establishments.

We extended the scope of the study to cover all regions of Hyogo prefecture and carried out antibody tests on 10,000 outpatients at five hospitals and medical examination facilities to investigate the rate of infection. Only 0.15% of patients were positive for SARS-CoV-2 neutralizing antibodies in the tests conducted between August and October of 2020. It is believed that this percentage of positive test results indicates cases that were mostly asymptomatic. At the same time, the results highlight the need to be aware that there are many people who have yet to be infected. We conducted this research with Hyogo Prefecture and thanks to them we were able to obtain the cooperation of the doctors and testing departments in each hospital. There has been a wonderful sense of solidarity among all the people involved in this research including the staff of Kobe University Hospital's clinical laboratory and division of clinical virology, and the students.

Currently, we are focusing on research into illuminating the mechanism behind the development of severe COVID-19 symptoms. We would like



to find the answers as to why the majority of young people are asymptomatic or exhibit only mild symptoms, whereas many elderly people exhibit severe life-threatening symptoms. It is vital to illuminate these aspects in order to promote thorough understanding of this unknown virus.

We are also conducting research into developing antibody drugs and vaccines for SARS-CoV-2. Given that it is a new virus, we are making discoveries just through studying it. This research is beneficial as the results will contribute towards the development of treatments.



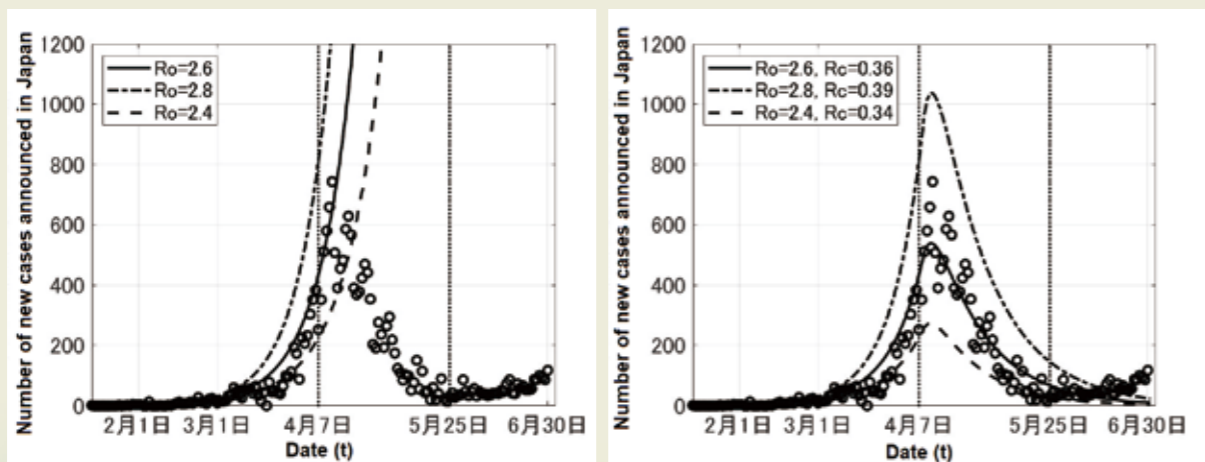
Professor MORI Yasuko
Center for Infectious Diseases, Graduate School of Medicine

Using mathematical models to predict the spread of the novel coronavirus

Towards creating a new model that also shows the impact on the economy

I am currently conducting research into mathematical models to show infection prevalence. The majority of my research involves theoretically analyzing the mathematical characteristics of these models (such as SEIR models), but recently I have become interested in applying mathematical models to specific data on novel coronavirus infections.

I began by using changes in the numbers of infected people in the period from January to February 2020 to predict future changes, and was able to correctly predict the dynamics of the epidemic up until a month and a half after this period (until mid-April 2020). Actually, based on my calculations, the prevalence of the infection in Japan would have peaked in summer with tens of thousands of new cases in a single day, as seen during that time in countries such as the USA and India. Fortunately, my prediction turned out to be wrong and the number of cases in Japan decreased from mid-April. I hypothesized that this was due to the state of emergency that was declared on April 7 2020, and investigated this using the model.



Although a sharp rise in cases was predicted (the graph on the left), the number of infections actually decreased from mid-April 2020 (the graph on the right). Dr. Kuniya used this data to work out the contact rate during the state of emergency.

First, I mathematically estimated the infectiousness of the novel coronavirus by taking into account aspects such as the changes in the number of cases, the percentage of asymptomatic people, and the average period during which an infected person can pass on the virus to others. Next, I added the data on the changes in the number of cases during the state of emergency and calculated using the mathematical model how much direct contact between people had decreased during this period compared to normal circumstances. The results revealed that the contact rate was 0.14 during the state of emergency, which means that contact between people decreased by 86%.



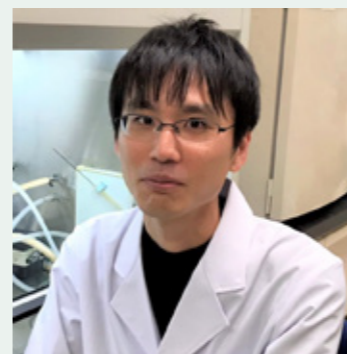
Associate Professor KUNIYA Toshikazu
Graduate School of System Informatics

I think that the reduced contact between people during the state of emergency had an impact on suppressing the spread of infection. However, we need to consider this fall in the infection rate in a slightly broader sense. Rather than saying that the number of people going out decreased by 80%, we need to take into account the effect of people keeping their distance from each other and wearing masks due to the state of emergency. Therefore, we must understand that there was a good reduction in the number of cases because all these efforts combined resulted in the contact rate falling by 80% percent.

Next, I would like to work on a model that can show the changes in the number of infected people from the end of May onwards. With this model, I would like to show that there are cyclical wave-like trends in the number of infections, which reflect the risks posed by people's behaviour. For example, people are more careful when they know that infections are increasing but on the other hand, people are less vigilant when they hear that infections are decreasing. In addition, my next challenge is to create a mathematical model that can also consider the effect on the economy based on the big impact that the state of emergency and other factors have had.

From a treatment perspective

Assistant Professor KOTAKI Tomohiro
Graduate School of Health Sciences



There is an urgent need to develop new medical treatments for novel coronavirus infections. Normally, the infectious virus is used to evaluate new drug candidates. However, due to the highly pathogenic and infectious nature of the novel coronavirus, the infectious virus can only be handled in a biosafety level-3 (BSL-3) laboratory. This presents an obstacle for treatment development. In light of this, we have modified the virus's genes to create a non-infectious self-replicative coronavirus gene (a replicon), which can be both safely and easily utilized to evaluate newly developed treatments. We will make further improvements to this replicon in the hope that it can accelerate the development of new drugs for novel coronavirus infections.

From a vaccination perspective

Professor Shirakawa Toshio
Graduate School of Science, Technology & Innovation



Infection control measures against the current novel coronavirus (COVID-19) pandemic are required on a global scale, and this includes developing countries. The development of vaccines is one effective tool that is contributing greatly towards controlling COVID-19. However, the majority of vaccines are administered by injection and this method is not very suitable for use in developing countries due to issues such as needle disposal. We are currently striving to develop a highly versatile, safe and effective oral vaccine against COVID-19 using an oral vaccine platform technology based on probiotic bifidobacteria. With government and industry support we are endeavouring to bring this new vaccine to people worldwide as soon as possible.

From an information dissemination perspective

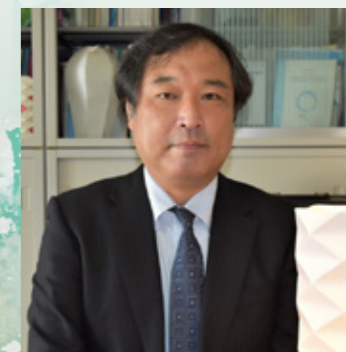
Associate Professor KARASHIMA Masato
Graduate School of Intercultural Studies



Microtourism (taking a short vacation in your local area) is currently receiving much attention as a method of reviving tourism in areas where the industry has been severely impacted by the pandemic. However it has been said that attracting private travellers from abroad could be the key to reviving the travel industry in the long term. In the Graduate School of Intercultural Studies we are currently conducting several projects to regenerate tourism through intersecting global and local cultural phenomena. Among these, there is a project that aims to produce tourism resources that are attractive to Jewish tourists by uncovering historical resources and trajectories which tell of the relationship between Kobe and the Jewish world. It is being funded by Kobe City (Urban Innovation KOBE) as a project that is tackling focal policy issues in a with/post-corona society.

From an education & educational resources perspective

Associate Professor SUZUKI Hirota
Graduate School of Engineering



I believe that the coronavirus will bring about a paradigm shift in architectural space design. Therefore, we established a competition in order to gather ideas based on the focal concept of 'separate but connected' in the post-corona period (Target: an open space in Faculty of Engineering, Applicants: Kobe University students). A first prize and 2 runner-up prizes were awarded in the Spatial Design category and a first prize was given in the Technical Proposal category. For more details about the awarding guidelines and a report on the award ceremony (where the prizes were presented by the former Dean of the Graduate School of Engineering, Professor OHMURA Naoto), please visit the Graphics Literacy Education and Research Center's homepage: <http://www.research.kobe-u.ac.jp/eng-glec/> (mostly in Japanese).

Expanding horizons of insect ecology research

-The thrilling discovery of a beetle's active escape through a frog's body-



What is *Regimbartia attenuata*? *R. attenuata* is a small aquatic beetle that is between 3.8mm to 5.0mm in length. Adults eat aquatic plants in habitats such as paddy fields. They normally swim under the water and sometimes fly above the water's surface.

Associate Professor Sugiura Shinji's discovery that a species of beetle can survive being eaten by a frog by escaping via its cloacal aperture has received much attention and has been widely covered by international media. The insect in question is *Regimbartia attenuata*, a small aquatic beetle often found in paddy fields on Japan's main island and in the south of the country.

Professor Sugiura's research is not just limited to this beetle; he has been investigating the interactions between various insects and other living things (such as plants) from an ecological viewpoint. He describes this research on *R. attenuata* as the 'discovery of an amusing aspect of insect ecology', however investigating interspecific interactions, such as those between predator and prey, is also important for the conservation of threatened ecosystems.

In addition, research into the forms and functions of plants and animals is presenting increasing possibilities for biomimetics, in which structures and properties found in nature are applied to the creation of new products that contribute to society. We asked Professor Sugiura about the hidden potential of research on insects.

Researching insect defense mechanisms

Q. What kind of discipline is ecology?

Prof. Sugiura: It is generally defined as research into the interactions between organisms and their environment. I am dealing with the interactions between various species and between individuals of the same species.

Q. What is the difference between biology and ecology?

Ecology is a branch of biology. I think that most fields of biology involve conducting research on a cellular level and below, for example DNA, however ecology mainly deals with matters on an individual level and above.

Of course, ecology also involves studying DNA but it covers an extremely broad range of areas including research into environmental aspects like carbon and nitrogen cycles. My research fields are community ecology, species interactions and behavioral ecology. My research often involves insects, so you could also say that my field is insect ecology.

What is the significance of researching and teaching ecology at the Graduate School of Agricultural Science?

I am a member of the Laboratory of Insect Biodiversity and Ecosystems. The study of insects has always been conducted as part of the field of agriculture because research into controlling pests has been important for agricultural industries. Consequently, entomology began under the umbrella of agricultural studies and this is why I conduct ecology research using insects.

What does researching insect biodiversity and ecology involve?

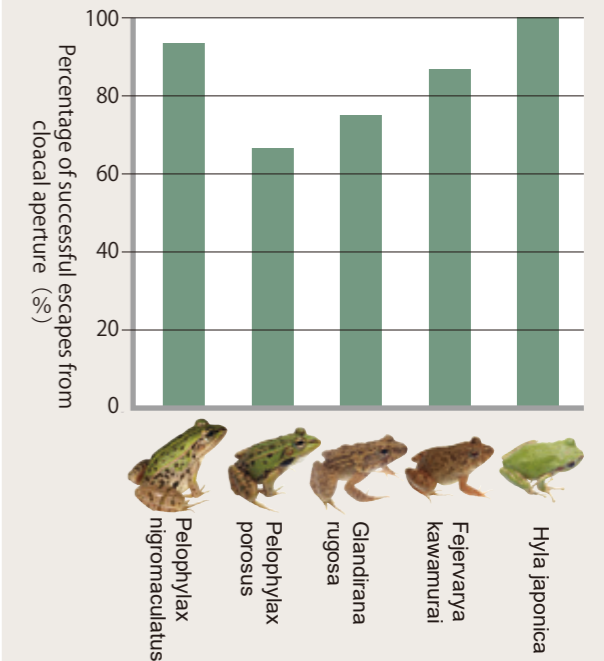
First of all, it involves taxonomy; describing a new species that does not have a scientific name yet. Secondly, it involves biodiversity studies, which includes defining how diverse insects are. Thirdly, it also involves ecology, which consists of describing insect life histories and behaviors. For example, this includes identifying pest insects and natural enemies in a specific area and investigating the structure of

Interviewee Profile

SUGIURA Shinji
(Associate Professor, Graduate School of Agricultural Science)

Dr. Sugiura graduated from Kyoto University in 2004. Before taking up his current position at Kobe University in 2013, he was a researcher at the Forestry and Forest Products Research Institute. He has received the 18th Denzaburo Miyadi Award from the Ecological Society of Japan and the Young Scientist Award from the Entomological Society of Japan for his work that has focused on the ecological roles of insects and species interactions. He is interested in insects' interactions with various other organisms, including plants, birds, mammals, amphibians, fungi and slime molds.

Successful escape rates of *R. attenuata* from 5 frog species.



Professor Sugiura discovered that even after being swallowed by one of the five frog species above, *R. attenuata* individuals are highly likely to escape alive via the cloacal aperture. ※

insect communities, or which insect species function as pollinators of flowering plants.

One of the likely reasons that pest populations are increasing is that their natural enemies do not often eat them. Why is this the case? I am interested in how insects defend themselves against their natural enemies, so I conduct research into their defense mechanisms.

Are all these research topics related to agriculture?

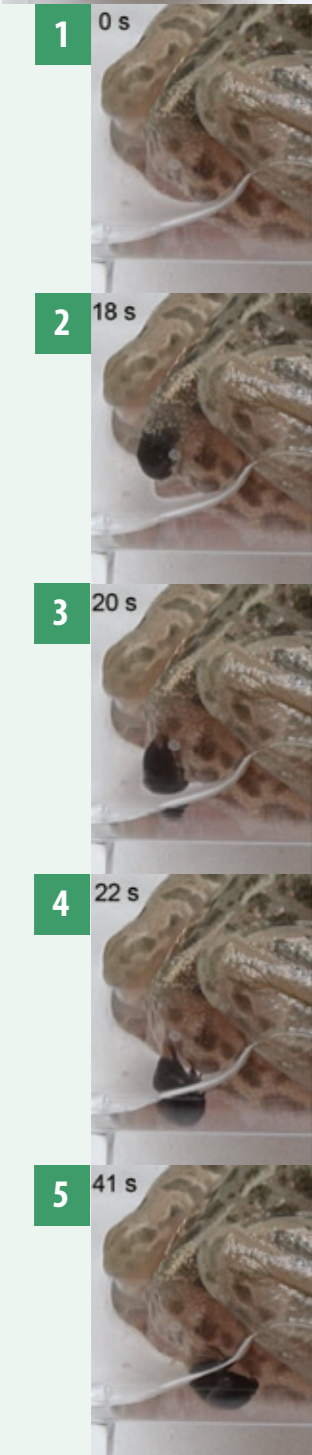
This has always been the case. Actually, some students are moving away from the agricultural angle and conduct research purely on insect ecology. My research on *R. attenuata* is a result of this movement. I hope that this story entertains ordinary people (laughs).

How *R. attenuata* escape from frogs

Have you been researching the ecology of *R. attenuata* for a long time?

No, this discovery happened by chance. Some years ago, I began studying the defensive behaviors of various insect species that live in farmland areas. Up until now, I have provided frogs with over 50 insect species to investigate their defenses against frogs. I place a frog and an insect in a plastic case and observe their interaction. Frogs can catch insects with their tongues in the blink of an eye. In order to investigate what kind of defense mechanism the insect used, and to confirm whether it was eaten or managed to escape, I film this interaction and then play it back in slow motion.

R.attenuata escaping from a black spotted frog (*P. nigromaculatus*)



*Cloacal aperture: This is the opening of the cloaca- a hole through which undigested food, urine, eggs and sperm are passed. It is mainly found in cartilaginous fish, reptiles, amphibians and birds. Some mammals also have a cloaca.

So you continued filming the frog and then discovered that the beetle had escaped about an hour or so later, right?

I did not film the escape the first time it happened. When I checked on the frog about an hour and a half after it had eaten the beetle, I noticed that the beetle was in the case too. I always check the frog's mouths after they have eaten to see if the insect has been swallowed. I was certain that the frog had eaten this insect so I realized that it may have escaped from the frog. At that point, I didn't know whether it had escaped by being regurgitated, like the bombardier beetle, or if it had escaped via the frog's behind (i.e. through the cloacal aperture*). Subsequently, I was able to capture the beetle's escape on video and could confirm that it came out of the frog's behind.

Is it rare for a creature to be able to escape via the predator's behind?

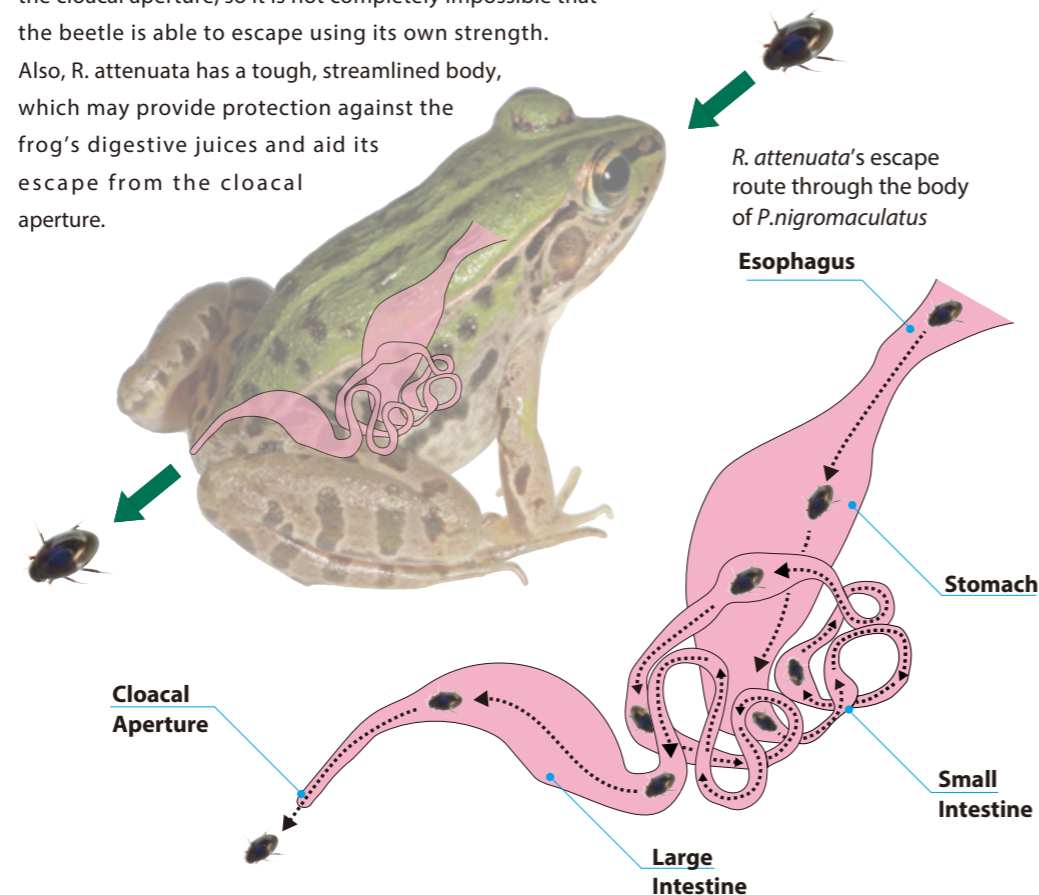
Yes, it is. Although there are some species that are known to do this, they are usually expelled at the same time as the excrement.

Normally, consumed insects are expelled from the frog's body as excrement 1 to 2 days after being eaten. *R. attenuata* is able to escape alive after a period of time ranging from a few minutes to six hours at the longest, without having to wait for the frog to excrete it. I think that it does this either by actively trying to escape or by stimulating the frog's gut to promote excretion. I believe that this is the first time that such a quick, active escape of prey from the body of a predator has been documented.

Do you have any plans to research how the beetle promotes its excretion?

I have conducted experiments where the frog was given an *R. attenuata* that cannot move its legs. The beetles were unable to escape from the predator's body in these cases. I am not yet sure exactly how *R.attenuata* escapes but I believe that it uses its legs and movement to promote excretion rather than producing a chemical substance. For example, people use suppositories as a laxative. Suppositories work by causing gas to build up when they are inserted into the rectum, which in turn puts pressure on the digestive tract and promotes excretion. I think the movements of *R.attenuata* might have a similar effect, as in they put pressure on the frog's digestive tract which promotes excretion. However, I recorded video footage of an *R.attenuata* crawling out of the cloacal aperture, so it is not completely impossible that the beetle is able to escape using its own strength.

Also, *R. attenuata* has a tough, streamlined body, which may provide protection against the frog's digestive juices and aid its escape from the cloacal aperture.



Clarifying the structure of species interactions

How can you investigate the beetle's actions inside the frog's body?

There are some species of frog found overseas that have translucent skin. You can see the frogs' internal organs from the outside, therefore if I fed *R.attenuata* to these species it may be possible to observe the beetles' movements inside the frogs. In addition, a modified translucent frog has been developed in Japan. I hope that I can use these frogs in my experiments.

Insect research and its contribution to society

You have conducted research on a wide range of insects and plants. Is there a research topic that you are particularly intent on pursuing?

For the moment, I would like to focus on researching insect defense mechanisms. I hope to examine the issue as to why certain pest species are increasing in number by elucidating their defensive behaviors against natural enemies.

Beyond that, I think it would be good if my research could contribute to society in an interesting way. Rather than contributing directly via my own research, I would be happy if another researcher or research group could apply my results to their own work. For example, research on insects could be useful for the biomimetics field, in which researchers engineer new products or devices by imitating nature, such as the structures, functions and forms of organisms. Research on insects could be utilized in such a field.

So your research results could be applied to the creation of robotics technology, for example?

That is also a possibility but let me give you another example. There is a species of beetle that lives in the desert. On misty mornings, this beetle is able to trap water from the air on the surface of its body and consume these droplets of moisture. The surface structure of this insect has been illuminated, and products such as sheets and bottles that can accumulate water even in a desert environment are being developed by physically recreating the surface structure. Although this is not related to insects, geckos are able to climb slippery walls because the van der Waals force (i.e. the attraction between molecules) generated by the fine hairs on the soles of its feet enables it to stick to the surface. A new type of adhesive tape was actually developed by mimicking the hairs on the gecko's feet.

Your research is a treasure trove of possibilities for biomimetics?

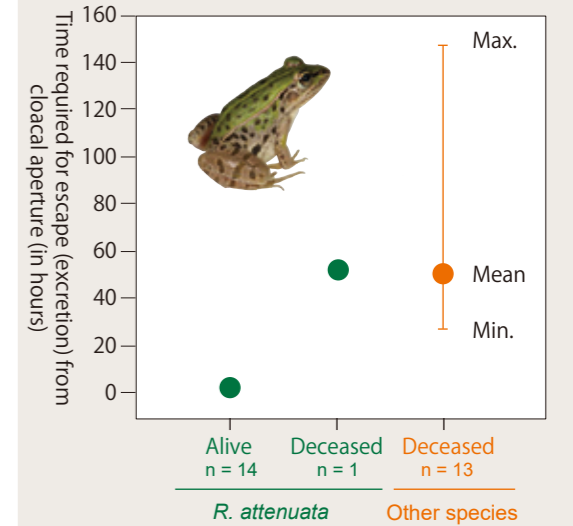
I am not able to come up with designs for these products myself as I do not have the engineering knowledge, however I hope my research can be used to create something useful for people.

In terms of social contribution, research into interactions between living things may be beneficial for the conservation of natural ecosystems. That is to say, if we can establish what kind of interactions exist between organisms; we can understand whether environmental factors will have a strong impact on the ecosystem. For example, some natural forests are able to protect themselves from invasive species. Even if an invasive insect species manages to enter the forest, there are animals that will consume it and the highly competitive native trees exclude invasive plant species.

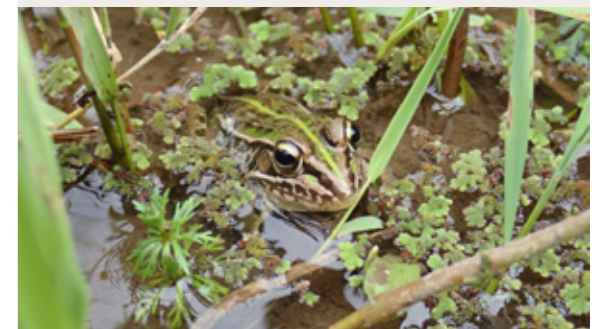
In other words, the competition between organisms and the relationships between predators and prey are intertwined in such a complex way that species from outside are not able to participate. In addition to this, such rich forests also help to minimize the impact of species proliferation and extinction. Species interactions encompass competition and predator-prey relationships among a wide variety of species. By conducting research into these interactions, we can get a sense of the strength of a particular ecosystem and be able to explain it in a logical way.

It is a fascinating area of research. Thank you very much for your time.

Time required for *R.attenuata* and other beetles to pass through the frog (*P. nigromaculatus*)



15 out of 14 *R. attenuata* individuals escaped alive from the frog's cloacal aperture. Only one individual was already dead when it was excreted. However all 13 the *Enochrus japonicus* individuals (from the same family of beetles) did not survive.



Giving children the opportunity to observe the stars

Astronomia is an astronomy group made up of student volunteers who plan and run astronomical observation events held at elementary schools to foster children's awareness and interest in constellations and science as a whole. It was established in 2009 as part of 'Kobe University Science Shop', an initiative that aimed to support renewed interest in science among the community by providing a place for dialogue between local residents and scientific experts. The group's activities were developed under its student leadership. We asked Astronomia's leader URAKAWA Shohei and PR officer TAMURA Sho about the appeal of giving children the opportunity to view stars through a telescope and the club's activities during the pandemic.

Holding astronomical observation events at elementary schools

Tell us about Astronomia's activities

Urakawa: We visit elementary schools and hold astronomical observations (viewing events) for the children.

Tamura: At Kobe University, there is an Astronomy Society and there are also volunteer groups. Astronomia is like a combination of these two types of groups and its unique appeal is that it is easy for students to join whether they are majoring in fields related to the Sciences or the Humanities.

So you are a volunteer group?

Urakawa: That's right. We visit elementary schools, show the children the stars through a telescope and teach the elementary school students about these celestial objects to foster their interest in science as a whole. However we are not overly conscious of the fact that we are volunteers.

Do only students run the group's activities?

Urakawa: Professor ITO Masayuki (Graduate School of Human Development and Environment) supports our group, however all our activity procedures are generally carried out by students- these include planning, making appointments with elementary schools, submitting and coordinating the event plans with school staff, and running the event on the day.

Do you contact the elementary schools first?

Urakawa: There have been times when elementary schools have invited us and other times when we have contacted the schools with our plan first. Most of our events are held at elementary schools near the university- we go to Tsurukabuto Elementary School every year. One of our former members is now an elementary school teacher, so we have been invited to that school too.

Adapting events on the fly depending on the weather

Do elementary school teachers object to their students gathering at night?

Urakawa: This is the part that we discuss the most with teachers. We try not to hold the events too late- we start the viewing at 6pm and finish by 8pm at the latest. In summer, the sky is still light, so we try to organize events at times of the year when the stars can be seen well even during the evening. Our main event for elementary schools is a moon viewing party. In winter, we can offer them a more varied experience as we can also show them well-known constellations such as Orion and the Winter Triangle.

Do the students' guardians also come to the events?

Urakawa: Yes. We tell the schools that children should attend the event with their guardian. The application form that the schools distribute before the event specifies this and the attendees' names must be written down. We then make a register and check the attendance on the day. This procedure provides reassurance to the schools.

How many people attend each event?

Urakawa: Including the guardians, there are usually around 50 people. First of all, everyone gathers in the classroom and we teach the attendees about the constellations that we will be



Astronomia Leader

URAKAWA Shohei
4th year mechanical engineering student
Faculty of Engineering



Astronomia PR

TAMURA Sho
4th year planetology student
Faculty of Science



One of the group's meetings



Members of Astronomia

viewing that day. After that we go outside to look at the stars. We have three telescopes and one of them has a large 20cm lens.

But you don't know whether the sky will be clear or not on the day.

Urakawa: It really depends on luck. Actually, there have been events where it was too cloudy to see any stars on the day. On these occasions, the children have been happy to listen to our talks about stars and the myths surrounding them. If it is even slightly possible to view constellations, we will set up the telescopes so that we can see different stars to the ones we originally planned to show and change our explanations accordingly- we adapt to the situation. For this reason, we check beforehand as a group what stars can be seen during the time period and in what direction.

What part do the children most enjoy?

Urakawa: The moon and nebula observations are popular. They were very happy when we could see Saturn's rings.

Tamura: The guardians also really enjoy those occasions too. As the club's PR officer, I take photos during the viewing events and post them on social media.

Giving children a hands-on experience of astronomy

As students of the sciences, why did you choose to join Astronomia instead of the more specialized Astronomy Society?

Tamura: Of course, I am interested in constellations but I also wanted to try planning events and creating learning resources. We work together to make the resources for the children to look at. We try to explain things in a fun way by making resources containing photos of constellations and images that make the myths easy to understand.

Urakawa: The enduring aims of the Astronomia group involve thinking about 'How can we capture elementary school children's interest?' and 'How can we explain this in a way that is easy for children to understand?' with regard to well-known astronomical bodies. There is no division between the humanities and the sciences. The members of the group have various reasons for joining, such as liking stars or liking children, and these differences also allow us to divide tasks between the group members well.

Tamura: In addition to the elementary school events, we also conduct regular viewing events for our group members to allow them to build up experience in operating telescopes. During these events, members can enjoy talking to each other and we have a meal together afterwards. However, over the past year it has been difficult for us to carry out our activities as usual due to the coronavirus situation.

Urakawa: Due to the impact of the coronavirus, we have been unable to recruit new students and as a result our membership has decreased by about 10 people. Last year we couldn't hold any viewing events and it probably won't be possible to conduct elementary school events this winter.

What about online events?

Tamura: Recently, we received an offer to collaborate on an online planetarium and night sky viewing event.

Urakawa: I think it is necessary for us to move our activities online, however the main appeal of the Astronomia group is that we offer children a real life experience, which involves interacting with the elementary school students in person and giving them the opportunity to actually handle the telescopes. This may not be possible for now, but I think that we will soon be able to hold club members' only viewing events again. We would like to restart our activities, so if you are interested, please consider joining Astronomia.





INTERNATIONAL COLLABORATION

The Fifth Kobe University – Beijing Foreign Studies University Joint Symposium was held

The Fifth Kobe University – Beijing Foreign Studies University Joint Symposium took place online on November 28 and 29. The event was jointly hosted by Kobe University and the Beijing Center for Japanese Studies at Beijing Foreign Studies University.

The theme of this year's symposium was "Epidemics and People/Society" in light of the great impact that the novel coronavirus has had on people's social lives. It featured a keynote lecture from Prof. NAKAZAWA Minato (Graduate School of Health Sciences) on the theme of the "History of Infectious Diseases and Human Adaptation to the Environment". Seven researchers from Japan and China gave presentations on what kind of impact the pandemic has had on people and society; how we have responded to it; and what measures we should take to live alongside the virus. These topics were tackled from various standpoints, including historical, literary, cultural and sociological perspectives. During the Q & A sessions, the presenters received many questions from researchers, even those in different fields, and a lively exchange of opinions took place. This was followed by presentations from doctoral students on the 29th.

Even though it was not possible to hold the event in Beijing as planned due to the pandemic, we were still able to further our exchange of research on this topical theme. It is hoped that the success of this symposium will strengthen the cooperative relationship between our universities.



Symposium participants at Beijing Foreign Studies University.

KAARb International Symposium highlights the importance of collaboration between East Asian countries in the COVID-19 era

On March 16, Kobe Active Aging Research Hub (KAARb) held an online international symposium on 'COVID-19 and the older adults in Asia'. Three esteemed directors of aging and social welfare research centers at Shanghai Jiaotong University, Ewha Womans University, and The University of Hong Kong respectively were invited to speak at the symposium. The online event attracted over 60 attendees from countries such as China, Singapore, France and the United States.

Chaired by Professor KATAGIRI Keiko (Director of Kobe Active Aging Research Hub at Kobe University), the symposium began with an opening speech from Professor KIMURA Kan (Director of Kobe University's Center for Asian Academic Collaboration at Kobe University). He expressed his hopes for enhancing research collaboration in the East Asian region, which is home to the world's fastest aging societies that also have similar COVID-19 outbreak trends.

Four presentations were given during the symposium to address the impacts of COVID-19 in China, Korea, Hong Kong and Japan. All speakers expressed serious concerns about the social isolation of older adults and reductions in the availability of both health and care services. They pointed out the importance of utilizing AI and ICT to help bridge the gap. The presentations covered a wide range of key topics such as government policies, COVID-19's impact on health and welfare systems, behavioral changes in elderly people, and mass media and ageism, which greatly interested the symposium's attendees.

In her closing remarks, Professor KATAGIRI thanked the speakers and attendees for making the symposium a success and expressed her hopes for the continued expansion of research collaboration among research centers in East Asia.

Visegrad Project Workshop held online

On October 23 and November 5 2020, Kobe University held an online Visegrad Project Workshop entitled "Comparing Responses to Global Transformations - Regime Changes in the V4 and Japan".

Kobe University was selected to receive the Visegrad Grants in 2020, and began offering a new course on social structure and global society post-corona. This course involves comparing aspects of Japan with those of countries in Central and Eastern Europe, which have experienced systemic changes and are dealing with globalization. It is run in cooperation with researchers from the following partner universities in V4 countries: Jagiellonian University (Poland), Eötvös Loránd University (Hungary), Comenius University (Slovakia), and Charles University (Czech Republic).

The workshop was attended by Professor Emeritus YUI Kiyomitsu and Professor SHIRATORI Yoshihiko (Graduate School of Humanities) and FUJII Mami (director of the Japan Foundation, Budapest). They discussed course management and future projects with researchers from each of the V4 countries. Patrick Vittel-Philippe, advisor to the Kobe University Brussels European Centre, was also invited to exchange views on the future expansion of international exchange activities between Kobe University and the V4 universities.

Kobe University will continue to promote further cooperation in education and research between Japan and Central and Eastern European countries.

Visit from the EU Delegation to Japan

On November 11, Mr. Haitze Siemers (Minister, Deputy Head of the Delegation of the European Union to Japan) visited Kobe University and met with Professor YOSHII Masahiko (the then Executive Vice President in Charge of Human Resources, International Exchange and Evaluation).

Professor Yoshii began the meeting with an explanation of Kobe University's activities in Europe. This included aspects of Kobe University's history, the establishment of overseas offices in Europe and their respective activities, academic cooperation agreements with European institutions, and the Jean Monnet Centre of Excellence, which is an EU-focused educational and research center.



Minister Haitze Siemers and Professor Yoshii Masahiko.

Minister Siemers expressed his views on the great importance of furthering scientific and technological progress in order to build a better society for future generations and exchanged opinions on how Kobe University can increase its active participation in the European research-funding scheme Horizon Europe. The discussion covered a wide range of topics, including Kobe University's EU-related education, the Japan-EU Strategic Partnership Agreement (SPA), the Japan-EU Economic Partnership Agreement (EPA) and SDGs.

Kobe University will continue to strengthen its connections with the Delegation of the European Union to Japan, as well as leveraging the Kobe University Brussels European Centre as a base for expanding the University's international exchange activities in Europe.

CIE holds short-term exchange program for Australian students

From January 6th~27th 2021, the Kobe University Center for International Education (CIE) held the Kobe Japanese Program January Session 2021 (Discover the Kobe Area and Japan- Australia つながり!). The program caters to students studying Japanese at our partner universities in Australia. The first session took place in-person in 2020, but the 2021 session was held completely online due to the pandemic. Sixteen participants from five Australian universities participated in the course.

Over the three weeks, the students took both Japanese Language and Area Studies from Monday to Saturday. The Japanese Language classes were designed as preparation for the Area Studies sessions, introducing relevant vocabulary and grammar. Having the chance to apply the new grammar points in a smaller group proved very popular with the students. In order to mitigate the lack of interaction that comes with online programs, CIE implemented a "Buddy system", pairing each program participant with a Kobe University student.

The Area Studies component focused on Kobe City and Hyogo Prefecture. Through virtual tours, video footage and live lectures from guest speakers, students learned about prominent locations as well as history, geological characteristics, various industries, and the effects of the Great Hanshin Earthquake.

In the Final Presentation, students utilized the vocabulary and grammar obtained on the course to present their personal findings about a つながり (link) between Australia and Japan. These presentations demonstrated the students' avid interest in and deep understanding of the various themes introduced in this course.

Kobe University's real-time online lecture on early Japanese cinema attracts students from all over the globe

On February 1st, the Program Coordination Section of Kobe University CIE hosted a real-time online lecture in Japanese on the topic of early Japanese film, as part of the 2021 Kobe University Winter Study Program.

Undergraduate and graduate students from across the globe were warmly welcomed to Kobe University's Zoom classroom, where participants were encouraged to learn, talk, and connect with each other on the topic of Japanese movies, with the session being facilitated by Associate Prof. ITAKURA Fumiaki of Graduate School of Intercultural Studies.

The 120 students who took part in the lecture hailed from academic institutions including University of California Irvine, Beijing Foreign Studies University, and The Hong Kong Polytechnic University. Participants were motivated to join the event due to their interest in

taking lectures in Japanese and studying abroad in Japan in the future. The lecture, entitled "Introduction to Japanese Cinema", introduced the roles of Benshi (who provided live interpretation) and their accompanying music, which were features unique to Japanese culture during the era of silent movies in 1910s. The presentation also included an introduction to and an actual screening of cutout animation, a technique that began in 1917 and was used in early Japanese animated films. Support was provided during the event to make the lecture more easily understandable for overseas students.

Throughout the event, participants exchanged comments and asked questions through the Chat function in Japanese and enthusiastically made the most of this online opportunity for learning and exchange. The excitement, demonstrated by the ten-minute extension added to the 60-minute lecture, was tangible even through the screen.

Fundamental research for the future: *Investigating how organisms develop their anatomical structures*

Q *What were you doing before you came to Kobe University?*

This was quite a while ago but I read the novel *Parasite Eve* which made me realize how miraculous animal's cellular structures are and I became interested in how these come into being according to the law from genes to behavior.

This made me want to learn about evolution. So, I researched animal evolution at the Prefectural University of Hiroshima. The model organism I researched was *Capsaspora*, which is one of the closest unicellular relatives to multicellular animals. Then to provide background knowledge for researching evolution, I decided that I wanted to know more about the how an initially single cell (zygote) constructs multicellular architectures via differentiation. So I entered Kobe University where I can conduct research that matches my interests.

Q *What kind of research are you doing at Kobe University?*

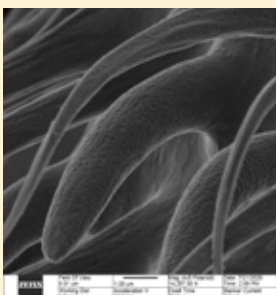
I am researching embryology and morphology mechanisms using common fruit flies. To be more specific, I am investigating the nanostructure formation mechanism on the surface of their exoskeletons. For example, morpho butterflies have colorful wings, which do not actually have any pigment. Instead, the surface structure is strictly ordered to reflect the same length waves to produce colors. However, various methodological issues need to be overcome in order to research the nanostructures of morpho butterflies. Therefore, I am conducting experiments using the common fruit fly, which is a model organism that can be genetically manipulated. It is different from the previous research I was conducting on a unicellular organism. Cultivating fruit flies involves keeping the room at a warm temperature and changing the vials frequently to keep their "cells" comfortable, so maybe I need "antennae" to receive updates on their living conditions.

Q *What surprised you when you first came to Japan?*

I thought the streets were very clean. There are litter bins in my home town but I was surprised that in Japan, the streets are kept clean even in areas where there are no litter bins. Also, I have travelled to many countries but Japan is without a doubt the safest.

Q *What are your future goals?*

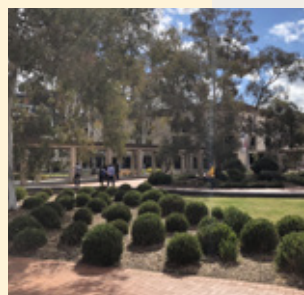
I would like to continue conducting research. Within the big topic of evolution, I'm interested in the gene that unicellular organisms have that is necessary for differentiation in multicellular organisms, and how it functions. If I can illuminate this, I think that I will gradually be able to understand more about the functions of differentiation-control genes that originate in ancestral unicellular organisms. The location or country where I conduct my research is not a priority for me. I prefer to focus on what I want to finally accomplish and choose research themes that interest me.



The surface of an olfactory sensillum of a fruit fly.



Sydney in May 2018 during his study abroad in Australia.



He previously studied at the University of Canberra.



At Prambanan temple in Java.

International voices



Sun Zhengkuan

1st year doctoral student studying biology in the Graduate School of Science.

Hailing from Qingdao in China's Shandong Province, his hobbies are travelling and playing the keyboard. He has previously studied abroad in England and Australia too. One of his favorite Japanese foods is sashimi. .



People's Republic of China

Qingdao (previously romanized as Tsingtao) is a port city located on the southern coast of Shandong peninsula. It is home to a population of approximately 9.5 million. Lots of architecture from the German occupation still remains and the scenery and culture lend the city a unique atmosphere. Tsingtao beer, a non-bitter lager, is famous.

Approximately 1,400 international students from countries around the world are currently studying at Kobe University. In this corner, our international students introduce their native countries and offer some insights on studying abroad in Japan.