

# Tokyo Tech Bio Newsletter No.19

School of Life Science and Technology  
Tokyo Institute of Technology

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## From the Dean

### Inauguration of Tokyo Tech's six new Schools

Hisakazu MIHARA

Dean, School of Life Science and Technology



The most remarkable event of AY2016 was of course the awarding of the Nobel Prize in Physiology or Medicine to Professor Ohsumi. The news came on October 3, 2016, and the atmosphere at Tokyo Tech has been vibrant ever since. Honorary Professor Yoshinori Ohsumi has been a Research Unit Leader of the Cell Biology Unit, Institute of Innovative Research, since April 2016. Along with the education reform, which I will come to later, research organizations have been reorganized, resulting in the establishment of the Institute of Innovative Research, which consists of four research Laboratories and ten research Units. Professor Ohsumi runs the Cell Biology Unit, together with four Professors and two Assistant Professors who have moved from the School of Life Science and Technology. Professor Ohsumi has often stressed the importance of basic science during press conferences. It is vital to increase basic science research, through which we can also develop the human resources needed to support Japan as a scientific and technological country. We need to continue and develop education and research that enable excellent Tokyo Tech students to

prepare themselves to lead society.

Faculty and staff worked hard in preparation for the School of Life Science and Technology's inauguration, which took place in April 2016. The education and organization reforms have now been fully implemented and Tokyo Tech has started steering itself toward its goal "to become one of the world's leading universities in the fields of science and engineering." I am truly amazed at and grateful for the faculty and staff who made tremendous efforts for the reform, especially during the past year.

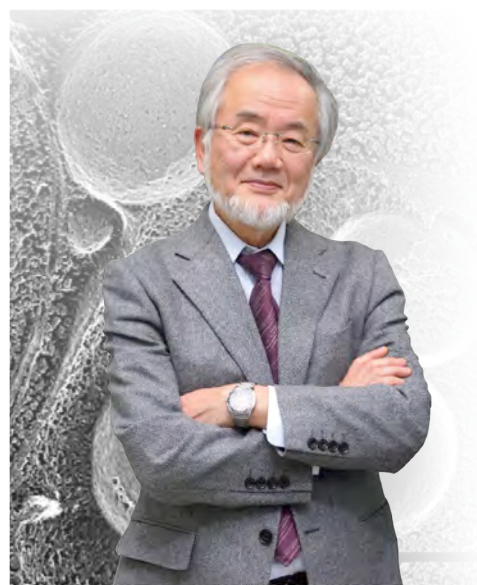
Many alumni may be aware of the new system after visiting the Tokyo Tech website. Undergraduate and graduate schools have been combined into 'Schools.' The Graduate School of Bioscience and Biotechnology is now known as the School of Life Science and Technology, reflecting a wider field of study. As for faculty, we now have a total of 120 members including Professors, Associate Professors, Associate Professors (Lecturers), and Assistant Professors as a result of combining the faculty of the former Graduate School of Bioscience and Biotechnology, former Interdisciplinary Graduate School of Science and Engineering, and Laboratory for Chemistry and Life Science (formerly the Chemical Resources Laboratory). I will skip the overview of the School of Life Science and Technology as I already mentioned it in Newsletter No.18 last year, but let me say that education at Tokyo Tech is mainly offered by departments in each School. In the case of the School of Life Science and Technology, there is only one department — the Department

of Life Science and Technology. All courses are numbered according to the order in which they should be taken according to the curriculum structure. In the bachelor's degree program, all 100-, 200-, and 300-level courses are offered at Ookayama Campus. Students who enrolled in 2015 or before and those enrolled in 2016 take basically the same courses. In the master's degree program, 400- and 500-level courses are offered. The main courses of the program are now offered in English, allowing both Japanese and international students to receive the same education. Students taking courses in the master's degree program can attend remote lectures at Ookayama and Suzukakedai Campuses. Liberal arts education is Institute-wide and compulsory in graduate-level studies as well. In the doctoral degree program (600-level courses), for example, students are required to take credits from Career Development Courses and Liberal Arts (Humanities and Social Science) Courses. The academic quarter system has been introduced in bachelor's, master's, and doctoral degree programs, where students attend class twice a week to complete two-credit courses, and take end-of-quarter examinations every two months, four times a year. Although this is a dramatic change, I think students have adjusted well to the new system. Until last year, in our Educational Program, fields of study were organized into small areas, which resulted in 45 departments. Today, they are grouped into 20 departments, each covering a wider field of study. In the Department of Life

Science and Technology, there are 75 Laboratories that accept students and conduct a variety of research. Under the current system, about 150 undergraduate and 180 master's students in the Department can be affiliated with any of the 75 Laboratories when they conduct research for undergraduate and master's degree theses. It will take a while for us to see the outcome of the education reform. We have to wait until graduates of the School play active roles in society. There is also a plan to revitalize the alumni association. I would like to ask alumni to take this opportunity to visit our school to talk about life science and technology with faculty and friends.

### Special Content

The School of Life Science and Technology is advancing world-class research and development in various fields relating to life, and is delivering many excellent results.



A Message from Honorary Professor and 2016  
Nobel Laureate in Physiology or Medicine

Yoshinori OHSUMI

Science is a human activity, built up as a body of knowledge over many generations. It is therefore impossible to separate scientists from the age in which they live. I myself am an example of this, drawing inspiration to undertake my work on autophagy in yeast from the scientific developments of the time and my own personal experience. While our understanding of the natural world continues to expand at a rapid pace, there are still many mysteries that remain to be solved. Many answers are in fact only the start of a new question. Rather than being captivated by the products of science and technology, I believe that the philosophy and broad perspective of science are more important than ever for the future of humanity.

My message for today's young people is to always keep an eye on the future. To perceive great authority before you merely indicates academic stagnation. Progress is realized through the preparedness of young people to challenge accepted norms and surpass their predecessors. Don't be intimidated by others and have the courage to embrace and develop your interests without being distracted by the relentless volume of information characteristic of our age. And make sure that you live a life you yourself are happy with, finding your own way with passion and resilience.

## From Staff Greetings

Thoughts on Retirement

Akira KUDO

Professor

For the year leading up to my retirement, my heart has been diffident. While my primary concern has been what to do with my life in retirement, I find that this is the same question I face when trying to understand what the idea of research has meant for me, personally.

This year, I finally went to visit the grave of an old friend, a Japanese researcher at Oxford University. For over fifteen years he had been my most trusted friend and research collaborator, until his death two years ago in the UK. I finally contacted his family about visiting his grave. At the time, although my friend had passed, he had apparently been disinclined to inconvenience the living, entreating before death that no one should feel any particular obligation to visit his grave. Upon reflection, I feel that this is something close to the prospect of retirement. I had decided to forego any retirement party or reunion with our laboratory alumni. However, as for the alumni, I was told that I wasn't considering the feelings of the graduates. One young woman, an overseas student, informed me of the Mongolian proverb that whereas one's debt of gratitude to a parent lasts a lifetime, that to a teacher lasts unto the ninth generation. Thusly persuaded, I'll be attending the alumni reunion, and I understand that many of our alumni will be joining us. I've also been reminded by a certain American professor, a longtime rival of mine, that one needn't have a laboratory to conduct research. Accordingly, I've decided firstly to accept an engagement as guest editor of an English-language review of the periostin molecule that I've been researching, and moreover, as a visiting professor at a private university, I'll be organizing an international academic symposium. Without going

so far as to say that my heart is now fully resolved, I don't feel it's going to be such a bad life, living year to year thinking about what lies ahead. Take care, everyone.

## Greetings

Development of chemical biology tools based on peptide and protein engineering.

Hiroshi TSUTSUMI  
Associate Professor

I was promoted to an associate professor in May 2016. I got a PhD at Ueno-Mihara lab (Tokyo Tech) in 2004. After I worked at Kyushu University and Tokyo Medical and Dental University as a postdoctoral fellow and an assistant professor, I came back to Tokyo Tech as an assistant professor in 2011. I am very pleased to be promoted in the year when our new organization, School of Life Science and Technology, started.

I have developed various functional peptides and methods to functionalize natural proteins based on an organic chemistry. Peptide is one of attractive materials because peptide has unique properties by designing secondary structure such as  $\alpha$ -helix and  $\beta$ -sheet. We can use not only natural 20 amino acids but also synthetic non-natural amino acids as building blocks. In addition, specific chemical modification of peptides and proteins makes it possible to produce useful molecular tools in the field of chemical biology. I have developed molecular tools for fluorescent imaging/sensing of bio molecules and lead compounds for drug discovery with the technique of chemical engineering of peptides and proteins. After I came back to Tokyo Tech, I started new projects. One

is development of highly functional biomaterials for the cell culture. Supramolecular peptide assemblies are designed to make peptide hydrogels similar to a natural extracellular matrix. Another is screening of useful ligands/inhibitors for target proteins. We improve a phage display method by designing peptide secondary structures and putting artificial functionality into peptides through chemical modification. Now, other projects related to chemical biology research are going on. There are many specialists on organic chemistry, microbiology and cell biology in our school, encouraging me to collaborate with them.

## Greetings

Toward controlling human gut environment

Takuji YAMADA  
Associate Professor



I was promoted to Associate Professor of Life Sciences Institute from April, 2016. I have conducted education and research at the Graduate School of Bioscience and Biotechnology for four years from 2012 to the previous year. It was my first experience to lead my own research by myself with the students and staffs. Although there were many difficulties, it was much more enjoyment. Prof. Ken Kurokawa who cooperatively operated the laboratory transferred to the National Institute of



Genetics. Therefore, I would like to strengthen my mind and tighten more and more.

My research base is bioinformatics, which is a study to understand the background system in life through analysis of large-scale data including gene sequence. I am currently conducting big data analysis of human intestinal environment. In other words, I am doing research to find the relationship between disorder of the intestinal environment and various diseases from the big data of human gut microbiome and its metabolites.

In addition to clinical data analysis through collaborative research with medical institutions, I also conduct various studies aimed to design human gut environment. In the collaborative research with Gurunavi Co., Ltd. launched in June 2016, we are doing microbial genome analysis making Japanese fermented foods. Furthermore, in the same month, MetaGen Co., Ltd., which started aiming at design human gut environment by quantifying the influence of food on the intestinal environment, was also certified as a venture from Tokyo Institute of Technology.

Over the next 5 years, through collaborative research with various research periods and companies that deal with foods, supplements, drugs, etc, I have established a method to control the intestinal environment by obtaining cross-sectional cooperation among all industry, academics and doctors to make a healthy intestinal environment.

## Greetings

Koichi HORI  
Associate Professor



I was appointed research associate in Ohta-Shimajima Lab at School of Life Science and Technology as of April 2016. I was engaged in genome analysis of algae as a CREST researcher until last year. I am interested in the transition of biological system which influenced the birth of terrestrial plants and secondary symbiotic algae. Evolutionary biology is one of the interdisciplinary research fields. I am struggling with acquiring a broad range of biological knowledge, but all experience of previous job (clinical examination), past research theme (plant virus vector, RNA metabolism, ribosomal protein and organelle targeting signal) and hobby (programming) are helpful for the understanding of plant evolution. I am honored to be able to challenge the mystery of plant evolution at School of Life Science and Technology. I will do my best to work on future research and educational activities under this new organization. I appreciate your continued support and encouragement.

## Events

### Open Campus 2016 for High School Students and Examination Candidates

Takeshi HATA

Associate Professor

This year, our Open Campus (OC) took place on August 11, 2016 (the Mountain Day national holiday), marking the third time we have held what

is on its way to becoming an established summer tradition at our university. The occasionally cloudy sky offered a slight respite from the sustained intensity of the summer heat, allowing us to enjoy ideal weather for the OC, which attracted about the same level of attendance as the previous year, welcoming over 15,000 visitors.



For the 2016 OC, aiming to highlight the full appeal of our university's engagements with research and education for prospective students, we chose "For High School Students and Examination Candidates" as our title, planning multiple campus-wide events. Since educational reforms initiated in April of 2016, our university's organizational structure has shifted from the traditional faculty-and-department model to a school-and-department model, and we focused on explaining the key points of these changes at guidance sessions for each academic group as well as those for the entire university (the School of Life Science and Technology defines seven "academic groups" that can be pursued in the Department of Life Science and Technology in Years 2 to 4 of the undergraduate degree. Graduate coursework is divided into the Life Science and Technology Course and Life Engineering Course). It should also be noted that, in cooperation with members of the Institute's Executive Committee, including our Dean Hisakazu Mihara, as well as faculty members,

students and administrative staff, the following events were seamlessly undertaken with reference to these seven academic groups, and I believe the appeal of these seven groups was readily conveyed to high school students and examination candidates, as well as their parents.

- Entrance Examination Guidance Sessions and Consultations by academic group
- Sample lectures by members of faculty at the School of Life Science and Technology
- Laboratory tours, laboratory open houses
- Poster presentations and panel explanatory sessions by undergraduate students for all laboratories at the School of Life Science and Technology
- Hands-on Corner "I Came, I Saw, I Touched! Life Science and Technology Research"
- An informal salon to exchange views and discuss academic careers with students and faculty in the School of Life Science and Technology
- A parent-oriented briefing session on entrance examinations for the seven academic groups
- A video presentation on the seven academic groups (also available on YouTube <https://www.youtube.com/watch?v=rBaZfSTiE4U&t=1s>)

In particular, the sample lectures by faculty members with the School of Life Science and Technology (delivered by Professor Kazushi KINBARA, Professor Hiroyuki NAKAMURA, Professor Satoshi MURAKAMI, Associate

Professor Shun'ichirō OGURA, Associate Professor Mikiko TANAKA, and Associate Professor Masato NIKAI DŌ) were very well-received. The lectures attracted a flood of inquiries from high school students and examination candidates about whether attendance was still possible, and audiences continued to grow well after the talks began. Attendance far outstripped the number of chairs we had prepared, and even after additional seating was brought from neighboring classrooms, it was so crowded that some students sat on the floor in front of the first row. This proactive attitude on the part of the high school students and examination candidates in the audience proved to be quite stimulating for the lecturers as well.



Finally, we are making efforts not only at the School of Life Science and Technology but also at the university-wide level to prepare for OC in the future, as well. It is my sincere wish that, by enrolling even one more student interested in our university's research and education from among these enthusiastic high school students and examination candidates, that our university might become an even more exciting place to be. I should also note that we are planning to hold our fourth OC on August 10, 2017, on the day before the Mountain Day national holiday.



## The 5th Bioscience and Biotechnology International Symposium

Takashi SUZUKI  
Associate Professor

This year's symposium topic was "Sense, Sensor, Sensation". Based on the topic, we invited two international speakers, three domestic speakers and two Tokyo Tech faculty members to cover topics related to "Sensory nervous system", "Molecular sensors" and "Taste/smell artificial sensors".



Prof. Thomas Clandinin (Stanford University, USA) told us about the mechanistic insight of the visual processing through his elegant study on the *Drosophila* photoreceptor circuit. Prof. Paul Feinstein (Hunter College, USA) explained his challenge on utilizing his super-sniffer mouse which has a predominant expression of one human odorant receptor in its nose. Dr. Yoshihiro



Yoshihara told us about his work on the ATP sensing mechanism equipped on Zebrafish’s nose. Dr. Atsushi Miyawaki (RIKEN BSI, Japan) and Prof. Hiroshi Ueda (Tokyo Tech) told us about their work on fluorescence-based molecular sensors that are versatile not only to basic biology but also to clinically oriented researches. From the engineering part, Professor Kiyoshi Toko (Kyushu University, Japan) and Professor Takamichi Nakamoto (Tokyo Tech) presented their artificial sensors and displays for detecting and delivering taste and smells.

“Sense” is in the center of our daily life, as we heavily rely on them as sight, smell, taste, touch and hearing. In this symposium, we had seven talks that were approached with both scientifically-oriented and engineering-oriented researches in equal balance: the former deals with how external stimuli are received and processed via sensory nervous system towards the center, and the latter deals with how to translate those mechanisms into artificial or engineered sensors. Having heard all the talks in one go, there must be small “interdisciplinary” reactions happened inside the audiences brain. I hope we could all share this sensational moment during this annual event.

Approximately 400 people attended to the symposium; most of them were also joined to the banquet after. We believe that all participants enjoined the exciting talks and scientific discussions. The committee members will continue organizing the international symposium with high scientific quality.

### 3<sup>rd</sup> Top Leaders’ Forum on Bioscience and Biotechnology

Kohji SEIO  
Associate Professor



The 3rd Top Leaders’ Forum on Bioscience and Biotechnology, to which Special Senior Professor Seiichi Shinkai of Kyushu University Institute for Advanced Study was invited to give a lecture, was held on Monday 28 November, 2016.

Professor Shinkai has won many awards for his achievements, including the Medal with Purple Ribbon, the Chemical Society of Japan Award, and the Award of the Society of Polymer Science, Japan, and he was a Thomson Reuters Citation Laureate. He is evidently one of the top leaders of the scientific community in Japan, yet despite his busy schedule, he very kindly took the trouble to come to Suzukakedai Campus for this Forum.



The forum was a resounding success, with over 270 participants, including more than 20 students, faculty members, and researchers from other departments. Suzukakedai Hall was so packed that many participants had to stand.

The title of Professor Shinkai's lecture was "Coincidence and Necessity in Bio-Inspired Research," and he spoke on exceptional research results, such as super-ionophores, a method of purifying fullerene  $C_{60}$  using supramolecular chemistry, molecular recognition in aqueous solution using boronic acid, and sugar–nucleic acid complexes. He interspersed this discussion with historical and philosophical aspects of research by introducing the background from which research of the highest level emerged and considering what it is that elevates research to the highest levels in the first place. Professor Shinkai's lecture was a source of great inspiration, not only to students in his specialty area of macromolecular chemistry, but also to students across wider areas of biology and biochemistry.

There were a great many questions from the audience at the end of the lecture, and Professor Shinkai answered each one individually with the greatest care, rounding off an extremely worthwhile forum.



As in the past, an exchange meeting for young researchers to meet Professor Shinkai was held in the office of the Dean prior to the lecture. At this meeting, young researchers of the Institute were represented by Associate Professor Shinichiro Fuse, Associate Professor Hiroshi Tsutsumi, Assistant Professor Naohiko Shimada, Assistant Professor Takahiro Muraoka, and Assistant Professor Yoshiaki Masaki. They presented the results of their own research, and Professor Shinkai gave his comments. He grasped instantaneously the essence of the research projects that were presented, and he put forward ideas and comments to help develop the research even further. For the young researchers, this was an enormously exciting opportunity.

At the end of the exchange meeting for young researchers, Professor Hisazaku Mihara, Dean of the Department of Life Science and Technology, explained the research and education system of the Department, which was launched in April 2016 in place of the previous Graduate School of Bioscience and Biotechnology. Professor Shinkai complimented the Department on an outstanding system with a major fusion of different fields for the purpose of implementing research at the highest level.

The 3rd Forum was a very successful event and served as a huge encouragement to students, researchers, and faculty members alike. We are deeply grateful to Professor Shinkai for his lecture, to those who took part in organizing the Forum, and to everyone who participated.

## Awards

### Kihara Prize of the Genetics Society of Japan

Hiroshi IWASAKI

Professor

I am very pleased that the Genetics Society of Japan has awarded me with the 2016 Kihara Prize. Past recipients of the Kihara Prize include highly revered scientists that have made brilliant contributions in the field of genetics. I am both honored and humbled to have the privilege of joining their ranks. This award was made possible by my teachers, who led me into the world of research with their warm guidance, and my students and colleagues, who conducted this research with me. I sincerely thank them all. In gratitude to them, I wish to continue devoting myself to research that boldly pursues the answers to unexplained problems, and in doing so I hope that I might instill an enthusiasm for molecular genetics in younger generations through communication and dedicated mentoring.

### Encouraging Prize of the Zoological Society of Japan

Understanding the Mechanism of Adaptive Evolution and Diversification of Vertebrates at the DNA Level

Masato NIKAIDO

Associate Professor

It is my great pleasure that I was honored with the Encouraging Prize of the Zoological Society of Japan. From the beginning of my research at 1997, I have been focusing on the adaptive evolution of animals. Especially, the mechanism of

morphological diversification in higher vertebrates through adaptive evolution is of my primary interest because the earth is full of interesting creatures in terms of their appearance (phenotypes). The goal of my research is to link such interesting phenotypes to genotypes by using the Darwin's theory of natural selection at the DNA level. Around 2000, I have published several important papers about the molecular phylogeny of mammals; 1. the phylogenetic position of hippopotamuses, 2. the monophyly of the toothed whales, 3. the phylogenetic relationship of bats within mammals. These studies attracted attention of many biologists including paleontologists and have been widely cited in the scientific journals.

At present, I focus on the cichlid fish inhabit the Lake Victoria in east Africa. The cichlid fish are the textbook example of speciation and parallel evolution. In particular, I am interested in the genomic region responsible for the parallel evolutions of adaptive morphology (e.g. lip thickness) of cichlids. To elucidate it, I performed comprehensive QTL mapping analysis by using more than 400 of hybrid individuals, leading to the finding of the candidate gene (genomic region) responsible for the lip thickness. I hope this study (including my previous studies) will become one of the hallmark papers to understand the phenotype evolution from genotype. Let's enjoy evolution.

### Tokyo Tech Challenging Research Award

Dynamic Functional Molecules Based on Multi-block Structures

Takahiro MURAOKA  
Assistant Professor



It is an honor for me to receive 2016 Tokyo Tech Challenging Research Award. The award title is “Dynamic Functional Molecules Based on Multi-block Structures”.

Multi-block structures consisting of two iterative domains with contrastive properties can be found in many proteins. Bio-inspired molecular design of such multi-block structures allows for the formation of a folded conformation in solution and in membrane as well as the formation of segregated stacking in a crystal, which can lead to demonstrating functions in multiple media. Based on this concept, I have been pursuing development of functional molecules with multi-block structures for wide-ranging directions. I am grateful to the past and present members and collaborators who contributed to this research and Prof. Kazushi Kinbara for his guidance.

### The Young Scientists’ Prize in The Commendation for Science and Technology by MEXT

Research on Bio-inspired Stimuli-responsive Functional Molecules

Takahiro MURAOKA  
Assistant Professor

It is such a great honor for me to receive 2016 The Young Scientists’ Prize in The Commendation for

Science and Technology by MEXT. The award title is “Research on Bio-inspired Stimuli-responsive Functional Molecules”.

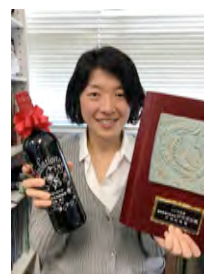
Biomolecules such as proteins perform a variety of sophisticated functions. Although there are many examples to alter functions of proteins by modifying their partial structures, a synthetic approach to mimic the biomolecular functions by totally non-natural molecules has been still limited, thus it is challenging.

Inspired by biological molecular machines and stimuli-responsive ion channels, I have successfully developed synthetic molecular machines with intra- and intermolecularly interlocked movable units and synthetic ion channels with organic ligand-gated reversible regulation. Such achievements are expected to lead to a novel approach for the development of synthetic functional molecules by mimicking the biomolecular functions.

I am grateful to the professors and collaborators who guided and contributed to these researches.

### JSE Award for Young Scientists

Izumi ORITA  
Assistant Professor



I received the JSE Award for Young Scientists from the Japanese Society for Extremophiles (2016). I was given the opportunity to give an award lecture in the 2016 annual meeting of the Japanese Society

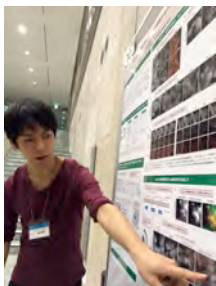


for Extremophiles held at the Suzukakedai campus, Tokyo Institute of Technology in November 2016 with the title of " Identification and functional analyses of genes in hyperthermophilic archaea ". Hyperthermophiles are the group of microorganisms who can grow in extremely hot environment (over 90°C). Surprisingly, these microorganisms are represented by deep phylogenetic branches of 16S rRNA-based phylogenetic tree. My study aims to elucidate the metabolism and hot environment adaptation mechanisms of these microorganisms by identification of novel gene function. I hope our findings will contribute to a better understanding of not only the life maintenance machinery of hyperthermophiles but also the evolution of life. Finally, I would like to express my heartfelt gratitude to my former teachers, my research collaborators, and Prof. Fukui for their generous supports. I would also like to express my sincere gratitude to all the students for their collaboration.

### Seiichi Tejima Research Award

Keisuke MOCHIDA

Department of Biological Sciences



I received the Seiichi Tejima Research Award for our research about “degradation of the nucleus and the endoplasmic reticulum (ER) via selective autophagy”, which was published in *Nature* in 2015.

I am honored to receive this award and would like to thank my supervisors and the collaborators.

Recently, it has been reported that various cellular components such as protein aggregates and mitochondria are selectively degraded by autophagy. In this study, we revealed that autophagy targets even the nucleus and the ER. We identified two receptor proteins, Atg39 and Atg40, which localize to the nuclear membrane and the ER, respectively. We revealed that these proteins mediate autophagic degradation of a part of the nucleus and the ER under nutrient starvation conditions. It was very exciting and valuable experience for me to have unveiled unknown mechanisms of degradation of these organelles by my own experiments. In the future, I hope to address unsolved questions raised by my research such as what components in the nucleus and the ER must be degraded by autophagy.

### Chorafas Foundation Awards

Looking Back on My Research Life in Tokyo Tech

Kazuhiro TAKEYAMA (2016 graduate, PhD)

Department of Biological Information

I am greatly delighted to have a chance to contribute this essay to Tokyo Tech Bio News Letter as a recipient of the EPFL Dimitris N. Chorafas Foundation Award 2016. The thesis title is “The role of osteoclasts and osteoblasts in the fracture healing”.

Developing biology is helpful for human society. This is one of the biggest motivation for me to study biology. I was interested in biology when I was a high school student, but I did not understand how biology is helpful for human being at first. The

lecture presented by a doctor who research mechanisms of rare diseases by using molecular biology techniques changed my mind. I decided to major in biology at that time.

My research was analyzing fracture healing mechanisms by using medaka fish. Using new fracture healing model I developed, I struggled to find similar system to mammals for the first 3 years. But, I recognized the evolutionary differences between mammals and fish as I studied. Then, I utilized the differences to explain common mechanisms during fracture healing for last 3 years. I finally demonstrated that osteoblasts migration induced by  $\text{tgfb}\beta\text{-2}$  signaling is essential for fracture healing.

6 years period from 4th year in bachelor course was too short for me. There were many chances to do interesting things which all would give me great experiences and improve my ability. But I was not enough talented to try everything. Most important thing I think now was imaging what I wanted to be in the future and initiatively selecting chances to try. Now, I work for development of new orthopedic medicine in Asahi KASEI Pharma Ltd. I will do my best to be a good biologist with my original mind.

Finally, I'd like to appreciate my supervisor Dr. Akira Kudo and Dr. Masahiro Chatani, who instructed me both officially and privately, and everyone who supports me.

## Chorafas Foundation Awards

Nobuhiro TAGO (2016 graduate, PhD)

Department of Life Science

It is an honor to receive the 2016 EPFL Dimitris N. Chorafas Foundation Award and to be given the

opportunity to write this letter. Firstly, this achievement would not have been possible without the dedicated guidance and support from my supervisors Dr. Seio, Dr. Sekine and Dr. Damha. I am tremendously grateful for their support and inspiration. I would also like to express my sincerest gratitude to my fellow group members, with whom I spent so long in the laboratory. I intend to continue my current research discipline, and aim to help further the development of life-science.

During my Ph.D, I mainly focused on the development of novel methodologies for the synthesis of modified DNA and RNA. After finishing my Ph.D, I began working as a post-doctoral researcher at Ludwig-Maximilians University (LMU) in Munich, Germany. My current research group is led by Prof. Thomas Carell whose research interests include DNA damage and repair and epigenetic modifications. In Prof. Carell's group, there are 9 postdocs and 30 Ph.D students, who study both biology and chemistry. Taking advantage of the multidisciplinary nature of the group, I intend to expand my expertise by learning biological techniques such as cell culturing, and peptide isolation. The LMU is located in the center of Munich, which is capital city of Bavaria in Germany. In Munich, there are several famous academic institutes such as Max-Plank Institute and Technical University of Munich. Besides science, Munich is also famous for holding the original Oktoberfest, which gathers more than 6 millions people for only two weeks in September.

If you are already studying abroad in Japan, you may not be so interested to study in Europe.

However, I would like to mention the unique experiences that you can expect in Europe, especially in Germany. Due to the multinational nature of Europe, you can expect to encounter people from all different cultures. In my group, there are members from Germany, France, Italy, the UK, Australia, Kyrgyzstan, and Cyprus. Working with these individuals has influenced not only my appreciation for other cultures, but also my scientific way of thinking. Furthermore, LMU frequently invites notable professors to give lectures, which gives me the chance to learn about cutting-edge research. In addition to the academic advantages, I am able to travel around Europe and experience nature during weekends.

Doing your postdoc in a foreign country may be daunting due to the challenges of acquiring a fellowship, communicating in a foreign language, and pursuing a career afterwards. I would argue that there are certain things that can be only learnt by taking risks. If you want to study abroad after graduation, consider Germany, where you can buy a bottle of beer less than 1€.

## Students' Achievements

### Tokyo Tech team extends gold medal record at iGEM 2016

Kazuki FUJISAWA

3rd-year

Department of Biomolecular Engineering

The students of Tokyo Tech obtained a gold medal in this year's iGEM competition (International Genetically Engineered Machine Competition). Tokyo Tech extended its world record of consecutive gold medals to 10 consecutive years

since the inception of the medal system. Of the 305 teams participating this year, the only teams to hold this consecutive record are the University of Freiburg (Germany) and Tokyo Tech.

The iGEM competition is an international synthetic biology competition mainly for undergraduate students. The student teams are given a kit of standard genetic parts, called BioBricks, and are asked to design and build a new biological system. Each team gives a presentation showing their results which is evaluated by the judges. This year, the competition was held in Boston from the 27th to the 31st of October. A total of 305 teams from around the world participated, including renowned universities such as the Massachusetts Institute of Technology (USA), Heidelberg University (Germany), and Tsinghua University. The competition is divided in 10 categories plus 4 new ones.

This year's Tokyo Tech Team consisted of 17 students from the School of Bioscience and Biotechnology, 1 student from the School of Science and 4 students from the School of Engineering. In order to transmit the importance of synthetic biology to society, the team recreated the fairytale of Snow White, which is well-known even in Japan, using E. Coli. They also released educational videos and gave classes in nearby high schools to spread the knowledge of genetic recombination.

#### ● Participating students

Kazuki Fujizawa (3rd-year, Biomolecular Engineering, Department of Biotechnology, School of Bioscience and Biotechnology)

Kentaro Akiyama (3rd-year, Biomolecular Engineering, Department of Biotechnology, School of Bioscience and Biotechnology)

Hiro Kondo (3rd-year, Bioengineering, Department of Biotechnology, School of Bioscience and Biotechnology)

Mizuki Tabata (3rd-year, Biomolecular Engineering, Department of Biotechnology, School of Bioscience and Biotechnology)

Yuya Netsu (3rd-year, Bioengineering, Department of Biotechnology, School of Bioscience and Biotechnology)

Shunya Akiyama (3rd-year, Department of Physics, School of Science)

Ryuta Sasaki (3rd-year, Department of Information and Communications Engineering, School of Engineering)

Narumi Ogawa (2nd-year, Department of Biotechnology, School of Bioscience and Biotechnology)

Mako Kono (2nd-year, Department of Biotechnology, School of Bioscience and Biotechnology)

Jiawan Sun (2nd-year, Department of Bioscience, School of Bioscience and Biotechnology)

Nozomi Takeue (2nd-year, Department of Biotechnology, School of Bioscience and Biotechnology)

Maoko Takenoshita (2nd-year, Department of Bioscience, School of Bioscience and Biotechnology)

Ayako Tamaki (2nd-year, Department of Biotechnology, School of Bioscience and Biotechnology)

Kengo Nakahara (2nd-year, Department of Biotechnology, School of Bioscience and

Biotechnology)

Miki Nishimori (2nd-year, Department of Biotechnology, School of Bioscience and Biotechnology)

Hazuki Hasegawa (2nd-year, Department of Bioscience, School of Bioscience and Biotechnology)

Nae Fu (2nd-year, Department of Biotechnology, School of Bioscience and Biotechnology)

Xin Guo (2nd-year, Department of International Development of Engineering, School of Engineering)

Alex Llacsahuanga (2nd-year, Department of Mechanical Engineering and Science, School of Engineering)

Koji Nishikawa (2nd-year, Department of Organic and Polymetic Materials, School of Engineering)

Yoshio Takata (1st-year, 7th Academic Group, School of Life Science and Technology)

Hajime Fujita (1st-year, 7th Academic Group, School of Life Science and Technology)

#### ● Instructors

Yoh-ichi Tagawa (School of Life Science)

Nobuhiro Hayashi (School of Life Science)

Nobutaka Nakashima (School of Life Science)

Masayuki Yamamura (School of Computing)

Daisuke Kiga (School of Life Science)

#### ● Campus Support

Global Resources Development Promotion Project

Tokyo Institute of Technology Revitalization

Aizawa Foundation

Tokyo Tech Alumni Association

Tokyo Tech Alumni Association Kanagawa Branch

Bio Creation Design Room





- External Support

Integrated DNA Technologies (IDT)

Cosmo Bio Co., Ltd

Promega Corporation

MathWorks

Saitama Global Development of Human Resources

Foundation

- Presentation Instructors

In-campus: Hiroshi Iwasaki, Yasunori Tanji, Jinji Hirota, Yuki Yamaguchi, Toshiaki Kamachi, Takashi Hirasawa, Shinji Masuda, Takeshi Hata, Yasunori Aizawa

Off-campus: Robert F. Whittier, Jon Mitchell

- Web Page

iGEM Official Home Page

[http://2016.igem.org/Main\\_Page](http://2016.igem.org/Main_Page)

Tokyo Tech Team Project Page

[http://2016.igem.org/Team:Tokyo\\_Tech](http://2016.igem.org/Team:Tokyo_Tech)

Tokyo Tech team extends gold medal record at iGEM (2015)

<http://www.titech.ac.jp/english/news/2015/032749.html>

Tokyo Tech students win at iGEM three years in a row (2014)

<http://www.titech.ac.jp/english/news/2015/029586.html>

Tokyo Tech students win at iGEM two years in a row (2013)

<http://www.titech.ac.jp/english/news/2013/024411.html>

## From Foreign Students

The Best Plan Award IGP Progress Presentation  
2016

Graduate School of Bioengineering  
Park HALIM



I am Park from Korea. I have been in Japan for two years now. The reason why I study in Tokyo Tech is that I have the goal of ‘creating a new tech that leads the human’. And I am interested in the research of the molecular scope. The Asakura laboratory is working for the construction of high reaction system of the electron transfer mechanism and the energy conversion efficiency of each redox enzyme. When I came to Asakura Lab I learned about electrochemistry. First time, I felt it was really difficult. But thankfully Lab members and Dr. Asakura helped me a lot. I started enjoying my research. In the laboratory, we are studying the production of hydrogen using enzyme electrodes. This study enables the production of energy that is harmless to the environment by light-driven enzyme electrode. My research of anode reaction is about transfer to cathode reaction system. Last 22th June, I had the opportunity to introduce my research

through poster presentation to the IGP members and professors from bioengineering. And I had a chance of getting an advice about my research from professors. It was great opportunity for making my research moving forward. Also I listened the research of other students. Thank you for the Best Plan (presentation) Award. By receiving this award, I was encouraged to study harder. Thank you very much.

The Best Poster Award IGP Progress Presentation  
2016

Department of Bioengineering

Natalia Maria THERESIA



I am very pleased to be selected as a recipient of  
The Best Poster Award at IGP Progress

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Presentation 2016 when I delivered my research entitled “Degradation of *Corynebacterium glutamicum* CspB protein upon EGTA treatment”. Currently I am studying the phenomena that EGTA, a calcium chelator, able to inhibit the strong cell wall structure of the *C. glutamicum* at relatively low concentration among other bacteria.

By finding the specific cell wall components affected by it, our laboratory aim to modify this well-known amino acid factory to be an efficient protein producer. I have to express my gratitude to Prof. Wachi Masaaki, Associate Prof. Noritaka Iwai, Ajinomoto CORYNEX Team, Dr. Ayako Takada, all lab members, and last but not least MEXT Scholarship for their generous support in both research and daily life. I am still and always learning so please take care of me too from now on.