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## MESSAGE FROM DEAN

### My Ambitions upon My Appointment as Dean of the Graduate School of Bioscience and Biotechnology

Professor Tomoya Kitazume  
(Department of Bioengineering)

"Vision 2009" For the Future of the Tokyo Institute of Technology defines the primary objective of the institute as follows:

Tokyo Institute of Technology regards

nurturing "knowledgeable, skilled, ambitious, peace-minded and harmony-seeking scientific creators of the times" to be its primary objective. We will endeavor to enhance the Institute's overall standing from a global perspective, prioritize strengthening fields capable of contributing to society, and create new values. We will **respect freedom and diversity**, pursue fairness, and strive to engender



the trust of the world. To realize this vision, we will nurture students in realms such as education, research, contribution to society, and international cooperation.

Based on this vision, the School and the Graduate School of Bioscience and Biotechnology aim to systematize bioscience and biotechnology and develop it in an integrated manner on the basis of science and technology. We intend to nurture human resources who can be responsible for a framework for international perspectives through interdisciplinary interactions in a wide range of academic fields of not only science and technology, but agriculture, medicine, pharmacy, and system engineering. We would also like to provide more lectures in English in the curriculum, take advantage of programs between Tokyo Tech and universities in overseas countries, and promote education of a humane nature. Since approximately 90 percent of undergraduate students go on to graduate school, we will offer programs for the undergraduate and graduate schools under a consistent policy. The graduate school will pursue both education and research as an interdisciplinary integrated institute for education and research, where we will actively introduce technology in biology.

To nurture human resources who will become pioneers in the coming age of life science, biotechnology, and medical welfare, and to respond to social needs from the view point of scientific technology, I will make every effort to resolve how we should develop education and research for the School and Graduate School of Bioscience and Biotechnology in the future through exchanges on and off campus, and in cooperation with our faculty and staff members.

## NEW STAFF

### Understanding of the Precise Mechanisms of Genome Integrity

Professor Hiroshi IWASAKI  
(Life Science)



Genome integrity is maintained through mitotic cell cycles so that daughter cells receive the correct genetic information. On the other hand, meiosis produces diversity of genetic information via homologous recombination. I am very interested in this ambivalent property (stability and plasticity) of chromosomes. Through various approaches such as genetics, biochemistry, biophysics and so on, I will contribute to our understanding of the precise mechanisms of genome integrity.

## NEW STAFF

### Development of “Single-Cell Genomics” for Functional Analysis of such Environmental Microorganisms

Associate Professor Yuichi HONGO  
(Biological Sciences)



My specialty is molecular ecology, microbial ecology, and environmental genomics. I have moved to Tokyo Tech from RIKEN on May 1, 2009, as an associate professor, and now setting up my laboratory in O-okayama campus. I have been studying the symbiosis between gut microorganisms and the host termite, and also the symbioses among the gut microorganisms. Since the majority of the gut symbionts are as-yet uncultivable, I am now attempting to develop “single-cell genomics” for functional analysis of such

environmental microorganisms.

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## NEW STAFF

### Bioinformatics, a Technology Extremely Compatible with Genomic Information

Professor Takehiko Itoh  
(Biological Information)



Since the completion of the sequencing of the *Haemophilus influenzae* bacteria genome in 1995, varied genomes are now being sequenced, exemplified in the finishing of working

draft sequencing of the human genome in 2000 and we are able to easily access to these information. The Genome – the ‘blueprint of life’ – provides us with a range of information to help uncover the complete mystery of the genes coded within it. However, only a small amount of the information about the basis of life buried inside the genome has been revealed. At Itoh Laboratory we are using bioinformatics, a technology extremely compatible with genomic information, to conduct a range of research projects that can contribute to developments in biology based on information about the human genome.

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## NEW STAFF

### Research Field

Associate Professor Kazunori TACHIBANA  
(Center for Biological Resources and Informatics)

In animals that lack a haploid generation, meiosis must be immediately followed by fusion of the gamete nuclei. Precise temporal coordination between meiosis and fertilization is required for reproducing the next generation. We use

starfish oocytes, eggs and embryos to elucidate regulation of meiotic and early mitotic cell cycles. Outfielder, Born: Iwate, Japan, B/T:R/R.



## EVENT

### Tokyo Tech-Tsinghua University Joint Symposium Held on November 30, 2009

Associate Professor Yuki YAMAGUCHI  
(Biological Information)

Tokyo Tech-Tsinghua University Joint Graduate Program was launched in 2004. Graduate students enrolled in the program are trained for approximately one year each at both institutes and, at the completion of the program, receive dual master's degrees from both institutes. This is the first dual degree program of this kind in Japan, and the program is also renowned for its bidirectionality. Five years since its establishment, the joint program has prompted the development of collaborative studies between the institutes. More importantly, the program has produced talented people who are capable of speaking Japanese, Chinese, and English, have social networks in both countries, and are expected to become international leaders of the next generation. Under situations where Japan and China are more tightly connected than ever politically and economically, such people are highly sought after, and the joint program is becoming more and more important.

To facilitate inter-institutional interactions at the levels of both faculty members and students, symposiums are



The Participant of the Symposium

held in both countries every year. As part of the program activities, the symposium entitled “New Frontiers in Biological Systems: from Molecules to Organisms and Environments” was held at the newly-built Tokyo Tech Front Kuramae Hall in Ookayama on November 30, 2009. Seventeen faculty members, administrative staffs, and students of Tsinghua University, including Prof. Xin-Hui Xing, the program leader of the joint program, came all the way from Beijing, China and participated not only in the symposium but also in other activities to cultivate friendships. The symposium was composed of three sessions: environment, chemistry, and medicine, and sixteen lectures were delivered by relatively young members in their 30s and 40s from Tokyo Tech, Tsinghua University, and private companies (Teijin, Nagase, and Toray). After the symposium, a social hour was held magnificently with the attendance of the President of Tokyo Tech Kenichi Iga, the former President Masuo Aizawa, and the Deputy Vice-Minister for Policy Coordination Shinjiro Komatsu.

Incidentally, due to the historic change in Japanese government last year, political leaders of the two countries are now closely related to Tokyo Tech and Tsinghua University. Yukio Hatoyama, the Primer Minister of Japan, was once an assistant professor of Tokyo Tech (industrial engineering), and Naoto Kan, the Vice Prime Minister, is a graduate of Tokyo Tech (applied physics), whereas Jintao Hu, the President of China, is a graduate of Tsinghua University (hydraulic engineering). Moreover, Tokyo

Tech will celebrate its 130th anniversary next year, whereas Tsinghua University will celebrate its 100th anniversary next year. At this special time, I would like to conclude this short article by expressing my hope that the joint program will be successful more than ever and will contribute to the friendship of the two countries.

## EVENT

### Facing Green•Sustainable Chemistry

Assistant Professor Hatsuhiko HATTORI  
(The University of Tokushima)

I graduated from department of biomolecular engineering at 2005. Immediately, I joined the laboratory of Atobe associate Professor (Lecture at that time) as a postdoctoral researcher to study synthetic organic chemistry by used an electron in the same campus.



When I studied organic electrochemistry by using an electron as a clean reagent and ionic liquid as a repeatable and less volatile solvent, it was trigger for me to be interested in Green·Sustainable Chemistry (GSC). Therefore, I have been studied synthetic organic chemistry based on GSC through AIST, Purdue University and the University of Tokushima. Recently, the GSC has become more and more important, since the campaign of "Challenge 25" that decrease 25% of greenhouse gas at the comparison of 1990, has been starting from January in Japan.

I thought that it was necessary to inform students about the concept of GSC, and I explained the design of molecular to recover organometal catalysis, a method for a catalyzed reaction to synthesize a compound that we only need, and a method for a catalyzed reaction not to give waste.

Therefore I considered that the reason why I was able to study above research. In Ph.D course student, I conducted experiments of organic synthesis from morning to night, discussed about it with my professor, and studied it earnestly. Especially, the important thing was discussion of organic synthesis with my professor because I could get the opportunity that I could gain his knowledge. I still remember the skill and the knowledge that I got in that time, and they became now my weapon of synthetic organic chemistry.

Finally, I want to say, borrowed plumes of my professor in USA, "You have your weapon (authentic technique) and keep it sharpness. If you do that, the way would be open."

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## EVENT

### High School Bio Contest 2009

Professor Hideya YUASA  
(Life Science)

"High School Bio-Con", the contest high school students compete in creating the teaching materials for biology, was held on Oct 10th, 2009 at Suzukakedai Campus. Twelve teams from the

following five high schools and a college gathered and presented their original products: Sagami Women's University High School, Yokohama Municipal Totsuka High School, Tokyo Metropolitan Shinjuku High School, Fuchinobe High School Attached to Azabu University, Hiroo Gakuen High School, and Tokyo National College of Technology. A team named "Blood Battle Corps E-Loon-Jar" of Sagami Women's University High School won the gold medal for the material, "We-Stop-the-Bleeding", with which pupils can learn the blood functions. Supporting instructors are the volunteer students of our Undergraduate School. The event was truly wonderful and invaluable in that students from elementary school to university and even the parents of them can study and enjoy together. I hope these efforts would be a platform for the consortium of regional education.




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## AWARD

### Student team wins gold medal at International Genetically Engineered Machine Competition (iGEM)

Shinya HARADA  
(Biomolecular Engineering, B3)

At the iGEM Jamboree, an international science competition, Tokyo Tech student team won a gold medal for the third year in a row.

iGEM is an annual synthetic biology competition for students, mainly

undergraduates: it can be interpreted as the biological engineering version of design competitions such as robotics competitions. Each university team is given in advance a kit of biological parts (i.e. pieces of DNA) called “Bio-Brick” and works for several months in his university to design and build biological system. All teams gather in November to present their products competing for the championship.

Team Tokyo Tech consisting of 13 undergraduate and graduate students (their names and affiliations listed below) launched the project last March. Working hard together with the advice of their senior graduate students (their names also given below) and faculty staffs (Daisuke Kiga *et al.*), they completed the “Mars terraforming” project, the creation of genetically engineered bacteria to be able to modify Martian environmental conditions. They successfully developed new model organisms crucial for the modification. A synthetic pathway of Melanin and temperature-regulated systems are resulted in success. Iron-oxidizing bacteria were cultured for energy production from recourse on Mars. For survival on Mars, anti-freeze protein was produced in bacteria. A communication system among the model organisms was developed to conduct those organisms.

The 2009 jamboree was the 4<sup>th</sup> competition since it had been open to teams from all over the world. In this year, 103 teams took part in the event which took place from October 31 to November 2 at MIT, USA.

Team Tokyo Tech student team received financial support from “Art and Crafts Education and Research Support Center”.

Members of Team Tokyo Tech are:

Undergraduate students

(Faculty of Bioscience and Biotechnology)

Shinya TAHARA, junior, biomolecular

engineering course

Tomohiro KOIZUMI, junior, life science course

Hiroyuki HIROTA, junior, biological information course

Tomonobu WAKABAYASHI, junior, biological information course

Nao NAKATANI, junior, biomolecular engineering course

Yui OSHIMA, junior, biological sciences course

Hiroshi SHIBA, junior, biological information course

Yu TAKEYAMA, junior, bioengineering course

Takayuki SHIMA, junior, biological information course

(Faculty of Engineering)

Akifumi NISHIDA, junior, dept. of control and systems engineering

Graduate students

(Interdisciplinary Science and Engineering)

Kazuaki AMIKURA, first year in master’s course, dept. of computational intelligence and systems science

Takeshi KIKUTA, first year in master’s course, dept. of computational intelligence and systems science

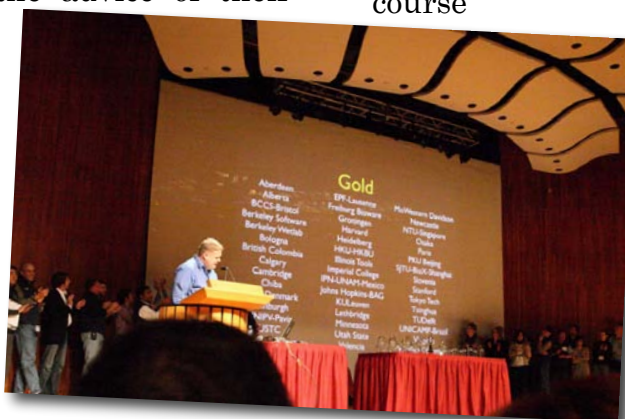
Ryota IGUCHI (participated as instructor), second year in master’s course, dept. of computational intelligence and systems science

Ryoji SEKINE (participated as advisor), second year in master’s course, dept. of computational intelligence and systems science

Shotaro AYUKAWA (participated as advisor), first year in doctoral course, dept. of computational intelligence and systems science

(University of Tokyo, Information Science and Technology)

Ibuki KAWAMATA, first year in master’s course, dept. of information science



**STUDENT****Postdoc Interview**

Akemi Moriyama

(Kudo and Kawakami Lab., D2)

Looking down on the busy street from the seventh floor of the research building, watching the cars and people go by, I was thinking of how I came up here. Last December, I was in Boston, USA. I was sitting in the room, waiting for my postdoc interview.

In my PhD course, I was working on a project with blood formation using medaka fish. When people hear “medaka”, they usually think of something pastoral; tiny fish swimming in the little streams of rice field. Not so many people know that the little bony fish, medaka and its close relative zebrafish, has recently adapted as a human disease model.

The lab which I was having the interview with, was a lab famous for using vast number of zebrafish trying to find clues to cure hematopoietic diseases and cancers. The PI was a big guy with a mustache, looked just like Mario, the famous game character. He explained his current projects. One of their recent findings was a chemical that increase the number of hematopoietic stem cells in the blood. Its effect was found in the screening of zebrafish, now is undergoing the clinical test of umbilical cord-blood transplant. “First chemical that came up from fish to human!” he said excitedly. After several discussions, Mario said “Yes, we are kind of trying to change the world with fish...”



With my “jet lagged” head I tried to imagine what the he had in his mind. I felt I came so far. Several days after I was back to Japan I received the mail that they would actually hire me. Now I am working to finish my project to get my degree, and to go back to that place.

**STUDENT****Participation in ELGRA (European Low Gravity Association)**

Masahiro Chatani

(Kudo and Kawakami Lab., D2)

Hello everyone, I am Ph.D. student in Dr.Kudo-Kawakami laboratory. We are researching osteoclast behavior *in vivo* using medaka fish. The **European Low Gravity Research Association** is devoted to the promotion of research under various gravity conditions in Europe. The organization provides a platform for all scientists interested in life sciences and technology in space or on ground. I participated in the organization in Bonn and enjoyed talking with my friend. Interestingly, there were some pianos in the street because Beethoven was born in Bonn, and I often heard nice music. In the night to find out which beers taste good, I drank some beer every day. I love German beer style. From my first presentation I gave in English in a foreign country and all the exciting experiences I had in Bonn, I gained confidence to face the challenges that are waiting in my life.



**STUDENT****Learn, unlearn and relearn**

ChoonPing LIM  
(Tanji Lab., D2)

I am a Malaysian student currently pursuing my doctoral study in Tanji laboratory, Department of Bioengineering. I will be entering the third year of my study this coming April 2010. My research is about the Microbiologically Influenced Corrosion at oil-gas related facilities. Tanji laboratory is like a small "United Nation" of which about one third of the lab members are foreign students from different countries. Having labmates of different nationalities in the same research environment, including Japanese, is really a great opportunity for us to interact and exchange ideas on research. And along the process "Learn, unlearn and relearn".

**STUDENT****Starting line drawing by TIT**

Wang Qian  
(Kobayashi Lab., M2)

I am an international graduate student belonging to integrated course in TIT, and now I am carrying on my research work, organic reaction development, in Kobayashi lab where I start my scientific dream. My name is WANG Qian, have graduated from Tsinghua University, Department of Chemical Engineering, in China. The terrific change of the major at first made me confused. However, my supervisor who is a fantastic knowledgeable chemist leads me coming to the organic artistic hall and satisfied my



eager of trying new experiences. And also, he gives me a lot of care in study and life. Furthermore, my lab members are very excellent, not only in the research spirit but their charm in character which have influenced me so much.

I love my lab more and more. Now I am in the second year of master course and I will spend several years here to enjoy my study life which will be one of the most valuable experience in my whole life and definitely an indispensable key to open my future.



## From the Editors

We are pleased to send you News Letter No. 12 with the help of members of the committee of BIOTITECH News Letters and the alumni/alumnae of Faculty of Bioscience and Biotechnology in Tokyo Institute of Technology. We hope that this letter helps you grasp how our School is developing and growing for the future.

With best wishes,

March 24, 2010  
Dr. Yuichi KOBAYASHI

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