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A Special Round-table

# Looking Anew at Scientific Pursuit and Education at Keio's Faculty of Science and Technology

**From this April, Assistant Professors Takasumi Tanabe and Yoichi Kamihara returned to Keio, their alma mater, as faculty members while Assistant Professor Yoko Saikawa came back after a one-year study overseas. The three fresh researchers suitable for the new school year have been invited to talk about Keio University as a venue of scientific studies and education.**

## Keio as a venue of scientific pursuit

**MC :** Mr. Tanabe and Mr. Kamihara, both of you have joined Keio's teaching staff from outside research institutions from this new school year. Will you tell us about your impressions of Keio: as seen from outside and as upon arrival at your respective posts?

**Kamihara :** A research institute is where people around you are all research specialists. All people working in the same field of study and having the same terminology at their fingertips – this is a very comfortable environment from the study perspective.

**MC :** I see.

**Kamihara :** But it is a very limited field. Of course the field we engage in contributes to society in a broad sense, but it remains a very enthusiastic field as an academic category. As a researcher, scientific research was the only work assigned to me, which sometimes made me worry about its value or significance. "Is my work really contributing to society?" "If so, is it appealing to the world?" . . . Questions like these.

At Keio's Faculty of Science and Technology, we rarely have two or more specialists in one specific field of study. The number of research fields is almost the same as the number of instructors. Accordingly many people say that they don't quite understand what I'm doing. In this sense, the world of Keio seems to be broader and multi-faceted. To put it another way, being with Keio puts me in a bit better position to become aware of my position in society.

**Tanabe :** I had exactly the same impression as his. According to circumstances, the realm of my study not overlapping with others' can be a demerit. But I think it's possible to turn it into an advantage if I expand collaboration with outside researchers and other fields of research.

Speaking of my impression upon arrival at my post, I can say Keio is filled with a very unrestricted atmosphere.

**MC :** Ms. Saikawa, you studied at Harvard Medical School. What idea or feelings did you have when attending Harvard? And how did Keio look like when seen from out there?

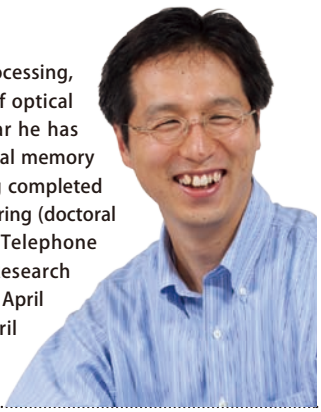
**Saikawa :** Ever since I first joined Keio as an undergraduate, I'd had no chance to study overseas – engaging for years in similar research themes at the same laboratory. Harvard Medical School is literally a "medical graduate school." As a person with little experience in traveling abroad, studying abroad itself was a challenge. So were the medical and biomedical fields that would be involved. Getting out of my laboratory appeared like a rare experience. "I will see and experience as many new things as I can" . . . this was the feeling I had before flying to the United States.

I got this opportunity thanks to our department's system that allows one young researcher to study abroad every year. Because of this system, I came to feel like studying overseas. It proved to be a truly precious opportunity for me since it would have been difficult to do so on my own.

Once settled there, I was greatly impressed with Harvard in some aspects. I generally found the students enjoying their own campus lives while studying hard at the same time – a major similarity with Keio. When people asked me where I was from, quite a few of them knew the name of Keio. I got the impression that Keio was well known globally.

If asked about my specialty, I am a person of chemistry rather than medicine. Not all researchers in the medical field are knowledgeable about chemistry, and vice versa. On occasion I saw chemistry still being held in high esteem in the world of medicine. Chemistry is a very old field of science whereas biology is gaining in popularity

## Takasumi Tanabe



To achieve extremely small-power and high-speed signal processing, Mr. Tanabe focuses on optical nonlinear control by means of optical microresonator based on photonic crystals and silica. So far he has succeeded in the development of an optical switch and optical memory that can be integrated on a semiconductor chip. After having completed Keio University Graduate School of Integrated Design Engineering (doctoral program) in March 2004, he joined Nippon Telegraph and Telephone Corporation (NTT) in April and was assigned to NTT Basic Research Laboratories with promotion to the research scientist post in April 2009. He assumed the current post at Keio University in April 2010. Awards he received include the Scientific American 50 Award in 2007.

**A day in his life**

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| 6:10 | Woken up by his wife, then waking his children. |
| 6:45 ~ 7:40 | Breakfast (Weekday breakfasts are the only time when all family members are present.) |
| 7:40 ~ 8:00 | Communication with children: preparation for escorting the first son to kindergarten and helping the second son in brushing teeth, etc. |
| 9:10 ~ 12:00 | Arrival at Keio. Conducts clerical work, such as checking of incoming e-mails and meetings with suppliers. |
| 12:00 ~ 13:00 | Lunch time (Frequents the coffee shop OKO.) |
| 13:00 ~ 21:00 | Conducts experiments, clerical work, etc. (May vary daily.) |
| 21:00 ~ 22:00 | Goes home while reading a printed thesis. |
| 22:00 ~ 24:00 | Dinner, then goes to bed. |

as of late. But I got the impression that chemistry is still a worthwhile pursuit.

**MC :** Imporrtance of chemistry has been recognized again because you went to Harvard Medical School, you mean?

**Saikawa :** Maybe so. Discussions often become hot and mutually aggressive when talking with persons from medicine. It seems we talk at cross-purposes as the other party never sees problems from the perspective of chemical structure. But if we communicated thoroughly, both parties would come to understand and say, "Oh, I didn't know about such a perspective." In this way I could learn many new perspectives and approaches, which was a valuable experience.

**MC:** What do you think Keio's good points are in developing research activities?

**Kamihara :** When it comes to scientific pursuit, we shouldn't hesitate to collaborate with other research institutes. Keio encourages such collaboration, which is good.

**MC :** What do you mean by "shouldn't hesitate"?

**Kamihara :** At universities, there is only one specialist for each specific field of study. This creates the possibility that I may be the only source of inputs for my students, which is pitiful. Of course other teachers with specialties close to mine are around and available for advice, which is important. At the same time it's important to communicate with outside people. In university's peculiar environment, scientific pursuit wouldn't develop fully if you hesitated to collaborate with the outside. We have to be outgoing. I'm always telling my students, "Go out and associate with outside people." And it's good that I can say so without hesitation.

**Saikawa :** Conversely, our department seems to be rather self-sufficient. There are as many as 30 teachers at our Department of Applied Chemistry alone, and our research fields range widely from those concerning compound structures to those involving elements of biology though within the framework of chemistry. Whenever you initiate something new, you can easily find good teachers right around you, who are willing to offer advice from the forefront of their respective specialties. Originally a graduate of Keio, I always feel at home here and see little barriers whenever I take up a new challenge. In this sense, I rarely feel it necessary to go out and seek information and technologies from various other fields.

**MC :** It sounds like there are differences according to departments . . .

**Tanabe :** With my department, too, there seem to be few overlaps, and I want to take advantage of it. In other words, I'd like to make the most of Keio's merits as a university. Another point is the effective use of the many Keio graduates who are active in the industrial world. We shouldn't forget that either. The work I'm engaged in is fundamental research. It takes a long time to put a project like mine to practical use. This makes it quite difficult even for specialists to envisage a route it will follow and what fruit it will eventually bear as a useful technology.

In spite of such difficulty, I feel somewhat compelled to appeal my work to society. So, by receiving advice from various people actively at work in the industrial world, I'd like to say, "I'm now doing this. Is there any good way you can use it?"

### Keio as a venue of learning for students

**MC :** From your viewpoints as teachers, what is Keio like as a venue of learning for students? And what do Keio students look like?

**Tanabe :** It seems that Keio has great diversity. There are so many different types of people. It may be partly because there are various routes of entry. Take leading national universities for example. Most students there are survivors of entrance exam wars. Look around and you only find winners. In the case of Keio, however, some have come all the way through Keio from the elementary school level. Also there are those who have been admitted by recommendation. And some have passed the entrance exam with a strong wish to join Keio while others may have joined Keio "regretfully" after failure with other universities.

**MC :** That's true. (laughter)

**Tanabe :** There are those who have experienced frustrations due to failure. The so-called "winners" can broaden their perspectives by knowing there are those that have experienced failure. Conversely, those having regrets may be encouraged or expand their scope of view by seeing other students enjoying bright campus lives. In my opinion, all these people with different experiences and mindsets getting together underlie Keio's diversity.

**Kamihara :** I don't know much about the students yet because I graduated from Keio five years ago and have just returned as an assistant professor. If Keio has not changed much from back then, I can say Keio students are good at helping each other. As Mr. Tanabe put it just a while ago, generally they are self-motivated, have a high ability for basic learning, and have latitude in seeing things. Students with mental latitude are helping each other in a friendly way. It may be safe to say this is the Keio culture. From my own experience as a dull student, I can say there is at least one bright student nearby. If you respect, target or copy that student, you can attain significant growth. In this respect, Keio offers an ideal environment.

**Saikawa :** Regarding "latitude," a variety of paths are made available at Keio.

## Yoko Saikawa

Focusing on key compounds responsible for natural phenomena, she works on isolation of such natural products and determination of their structures. She also addresses the synthesis of complicated natural compounds by ingenious means, such as intramolecular Doetz reaction method. In March 2003 she earned credits for Keio University Graduate School of Fundamental Science and Technology (doctoral program). In April 2002 she became assistant for Department of Applied Chemistry, Keio Faculty of Science and Technology. In 2004, she obtained a doctorate (science). In April 2008, she assumed the current post. From September 2008 to September 2009, she worked as a visiting scholar at Harvard Medical School (under Prof. Jon Clardy). Among other awards, she received an Incentive Award at the 45th Symposium on the Chemistry of Natural Products in 2003.

**A day in her life**

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| 5:30 | Waking. Seeing her husband off after handing him a box lunch. |
| 8:00 ~ 9:00 | Visits a fishing port in Yokohama to receive test samples. |
| 10:30 ~ 18:00 | Arrival at Keio. Some clerical work, experiments and discussions. |
| 18:00 ~ 19:30 | Masters' study meeting. |
| 19:30 ~ 0:00 | Preparations for class work, discussions, sample analysis. |
| 0:30 | Back home. |

I also have the impression that Keio is intent to foster latitude of students' individuality. Though I know little about other universities, Keio appears tolerant to almost anything students do – instead of fostering specialists from the beginning. In the worst case this attitude may lead them nowhere, but there are actually those students who maintain an unexpected combination of totally different interests, some saying "I like computation and organic chemistry at the same time." And such students advance and join laboratories without losing interest.

I know studying in laboratories inevitably requires specialized knowledge, but I'm doing my best so that they won't lose their multi-faceted interests. It's interesting to find gaps in them – unexpected gaps between their academic pursuits and their special abilities. It seems students who have been within Keio since childhood have been educated so as not to lose such individuality.

**Tanabe :** That's very important. I agree. In the field of science, one needs to focus on one particular thing. But engineers bring in two seemingly unrelated things and combine them to create something new.

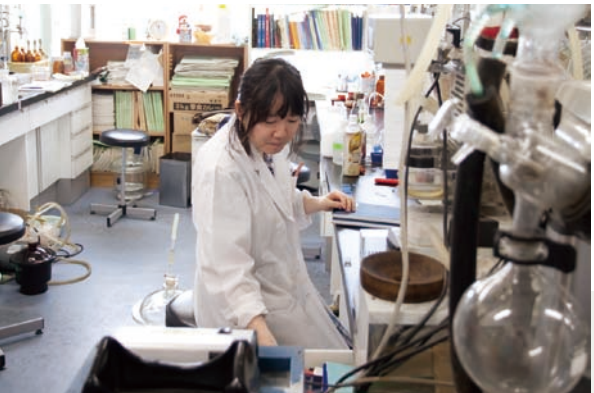
**Saikawa :** Yes, combining things ingeniously is a wonder.

### Momentums for becoming research scientists

**MC :** Now please tell us why you set your mind on science or chose your careers as researchers.

**Tanabe :** As a junior high student I saw an NHK Special TV program entitled "The Autobiography of Japan as an Electronics-based Nation." It was an account of Japan having striven as an electronics-based nation, introducing the transistor and other developments. So impressed by the program, I wanted to do something like that in the future.

**Kamihara :** Since childhood, I haven't been a type with special abilities. So, like most of the friends around me, I thought I would enter a university and find employment with a company. Looking at my school report card, I found myself rather weak at English . . . but math and science records were acceptable, which encouraged me to go on to a university. Because my father was a high school teacher, I wanted to follow suit. So, upon graduation, I took an entrance exam for Tokyo Gakugei University – the result was a total failure. During one year of preparing for the next chance, I frequented the home of my high school physics teacher when he recommended several physics-oriented introductory books like an introduction to the theory of relativity, which intrigued me. Then I was admitted into the present department the following year. Since then to date I have simply focused on challenges just before my eyes, going along the stream of things. I'm not a type with great ambition.



**Tanabe :** So was my case. I was so weak at the Japanese language that I had to choose the science course in college.

**Kamihara :** Ancient Japanese literature was interesting as far as its content, but I never became inclined to memorize what was written. After having escaped from all my weaknesses, I now find myself working in this course.

**MC :** Both of you left strong fields after having eliminated weak fields, right?

**Kamihara :** Well, to be exact, it's a field where I could be "competitive" with others, rather than a "strong" field.

**Saikawa :** To tell you the truth, I used to definitely be a liberal arts type student. I loved and was good at subjects like the Japanese language and music. I didn't like math and science so much. At home we often ate mountain vegetables. They might have been roadside grass. My eyes gradually opened to plants and the world of nature as I referred to an illustrated book of flora as to their classification and to check whether they were edible or not. I liked doing so and it was a necessity of life.

In the autumn of high school sophomore year, I had to choose which course to take, liberal arts or science. By that time, I was not so good at the Japanese language. I particularly disliked the ambiguity associated with questions like "Describe the author's thought or feelings." The teacher would give me an NG (X) mark to my answer but I couldn't understand why. Conversely, subjects such as chemistry and biology appealed to me as they used clear-cut approaches like "The constituents of this plant are so and so." So I suddenly decided to change my course from liberal arts to science. It was the catalyst for shifting my career to this side.

I seem to be an inquisitive type by nature, asking myself "What is this plant?", "What constituents is this made of?", "Is this edible?", "When does this plant grow?" and other questions. But basically I'm a liberal arts type person in the way of thinking. This sometimes makes me regret my course change when I talk with persons who have come straight through scientific pursuit.

**MC :** Well, each one of you has his or her own individuality. With these teachers credited with outstanding achievements, we're sure your students can foster hopes for a bright future. Thank you very much for your time and precious remarks. Newly arriving at your posts or just returning from overseas study, you must be highly motivated. We sincerely hope your research activities will develop greatly and produce superb results.

## Yoichi Kamihara

Toward the goal of "discovery" of compounds exhibiting high-temperature superconductivity, Mr. Kamihara creates and evaluates highly crystalline samples and pursues studies to elucidate correlations between local structures of the obtained crystals and their electrical properties and magnetism. In March 2005, he completed the doctoral program at Keio University Graduate School of Fundamental Science and Technology. From April 2005, he served as a researcher in the ERATO SORST Hosono Transparent Electroactivity Project at the Japan Science and Technology Agency (JST). From October 2008, he served as a researcher of JST's Transformative Research-project on Iron Particles (TRIP). He assumed the current post at Keio from April 2010. Chief among awards he received is the 13th Superconductivity Science and Technology Award (2009).

**A day in his life**

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| 9:00 ~ 10:00 | Arrival at Keio and check incoming e-mail. |
| 10:00 ~ 11:30 | Maintenance on X-ray analyzer, etc. |
| 11:30 ~ 12:30 | Lunch time. |
| 12:30 ~ 13:00 | Checking postbox for mail, and replying to e-mail. |
| 13:00 ~ 16:30 | Discussions with students on research work. |
| 16:30 ~ 21:00 | Preparation of samples and materials, and preparation for presentation. |
| 22:00 | Back home, dinner, and reads manga before going to bed. |

**For the full text of this interview, please refer to:**

**http://www.st.keio.ac.jp/kyurizukai**