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NEWSLETTER OF RIKEN Quantitative Biology Center

QBiTs

QBiC

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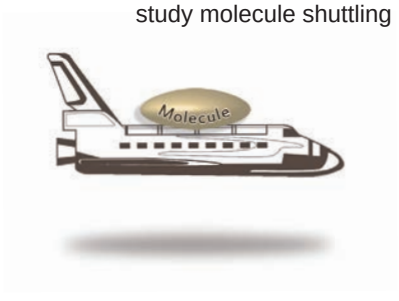

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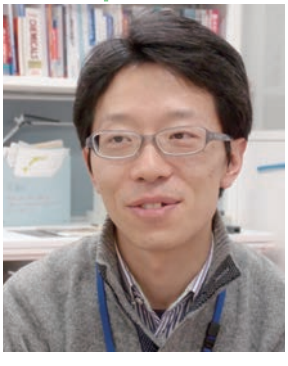
Hiroyuki Moriguchi
of the Yo Tanaka lab



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Talking with . . .

On Her Majesty's (not so) Secret Service

Ed Thomson, Science Consul at the UK Embassy in Osaka, speaks to QBiC about what a Science Consul does and why the UK believes Japan and especially Western Japan is an important partner

COUNTRIES LIKE JAPAN ARE ALWAYS PROMOTING RESEARCHER MOBILITY. WHAT IS THE U.K. POSITION?

In the U.K. it's actually seen as a positive thing if someone has spent some of their research time abroad. Getting some other kind of experience. Building their networks. Stimulating "brain circulation" rather than "brain drain". Rather than obsessing - this used to be the traditional thing where countries would complain about brain drain, which is the idea you train up people through your education system and as soon as they become qualified they gravitate towards better pay in other countries. What is becoming apparent is that that is not necessarily a bad thing.

The work that I had done in particular on international research policy and looking at these issues about how to stimulate international exchange, what the benefits are, the problems that need to be overcome and practical barriers that people face in building international networks, that's all really interesting, fascinating stuff. And it's really important for a lot of the ambitions that individual institutions and countries have in developing a knowledge economy, addressing big social challenges like climate change, aging population, food security. You need very high quality science to do that. Particularly as science becomes more specialized, the individual science problems that people are trying to address are increasingly narrow. As people become experts in quite narrow disciplines, it's less likely you can put together groups of people or find exactly the collaborators you need within one institution and increasingly even within one country. So if you trying to deal with some big scientific problem, more and more you are going to look at a big consortium of researchers working together. Continuing to work on that sort of stuff seemed interesting.

> *"more and more you are going to look at a big consortium of researchers working together."*

WHAT TYPE OF STRATEGIES OR POLICIES DEMONSTRATE THIS EFFORT?

We want to create a system that doesn't have any inbuilt bias or discrimination. We do not want people not to move because of something not related to the actual work. We want universities to attract as broad a pool of applicants as possible. There is this desire to remove as many impediments as possible. Try to increase the sense of comfort and the ease in which people can move from country to country. Find ways to allow people to have a bit more confidence about these other things that affect people's career decisions like employment rights and social security.

DOES THE SCIENCE AND TECHNOLOGY TEAM IN JAPAN HAVE A CLEAR PURPOSE?

The UK government does two things. One is support the UK science base in developing and sustaining international contacts. And the other is using science to support various UK government ambitions. The job falls into two broad parts and part of it is dealing with practical issues about science collaboration. Developing workshops to put people together to try and build relationships in subject areas where there are not many between the UK and Japan. Doing work with funding agencies to establish joint calls for proposals. Generally disseminating information to the UK science base about things that are happening in Japan to encourage people to take an interest and make people aware of the opportunities that exist here.

Then there is this second package of work about the science policy. Doing analysis of Japan's own science policies and the role that Japan sees for science in wider society, in stimulating the economy. The lessons we can take from that to the UK. Looking at issues like climate change and these big diplomatic efforts to build international consensus. We get involved in doing some analysis of the scientific arguments in different countries and development of the scientific evidence. Helping colleagues in other parts of the embassy who are working with Japanese organizations by coming to agreement with emission targets for example. The same goes over a range of other areas. Food security. Cyber security is an issue that we are looking at the moment where globally there is a big diplomatic push to establish norms of behavior and definitions of what is a cyber crime, for example. We are contributing to that by providing some technical input. I am trying to stimulate a degree of scientific exchange to improve the capabilities of each country to collaborate to develop technical solutions and scientific analysis of human behavior in cyberspace.

HOW DID YOU BECOME A SCIENCE CONSUL?

Kind of by accident. I wanted to do some kind of international career. I started off in the civil service working on education policy. Most of the jobs that I did had some international relevance. The Foreign Office was recruiting for a number of science and innovation roles. I can't remember the list of countries they were recruiting. Japan seemed really interesting. I never really thought seriously about traveling to Japan before, but I think precisely because it was not the kind of country I imagined myself to live and work in…it looked new and kind of exciting.

WHAT'S THE ORGANIZATION OF THE TEAM?

I'm based in Osaka. We have a team of 8 people across Japan. Six in the embassy and two in Osaka. Just because of the spread of Japan's science based and spread of scientific expertise across the country, it seems sensible to spread our team a little bit as well.

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UK Embassy-QBiC Partnerships

Shortly before the end of the year, QBiC Group Director Makoto Taiji teamed with Dmitry Nerukh of Aston University to organize the closed workshop, *High Performance Modelling of Multiscale Biomolecular Systems*, in cooperation with the British Embassy in Tokyo. The event brought together five professors from Japanese institutes and five from U.K. institutes to discuss their research and stimulate overseas collaborations. Although "biomolecular" appears in the title, the sessions were more focused on the problems of multi-scale simulations. While all the talks garnered interested, the UK visitors were most excited by Prof. Taiji's descriptions of the K-computer and MD-GRAPE4 (see QBiTs Jan.,2013). Many of the UK members even travelled to Kobe to see the hardware and expressed their eagerness to meet Prof. Taiji again later this summer at a meeting organized by Prof. Sergey Karabasov, another of the workshop's participants, at which time MD-GRAPE4 should be completed. Kevin Knappett, Head of the Science and Technology team in Tokyo (and Ed's boss), added that while such events happen on the embassy grounds on a monthly basis, there is hope of having some off site in the Osaka-Kobe area with QBiC cooperation.

When it comes to specific issues our team is a bit more flexible to handle these things. The quantitative biology project [see UK Embassy-QBiC Partnerships on p3] was organized by our life science team in Tokyo. And similarly in Osaka we ran a program on smart grids, but one of the workshops we held was at the embassy.

HOW DO UK SCIENTISTS REACT TO JAPANESE SCIENCE?

I think generally when people from the UK come to Japan, one of the things that strikes them is the availability of facilities. Large scale science infrastructure. Japan is very rich in that kind of stuff. There is a whole range of supercomputing in Japan that is impressive. There are other major facilities like Spring 8, the XFEL and all those stuff down in Harima. Big investment by Japan, which looks very impressive to pretty much anyone from overseas. One of the things they also comment on is when they get the opportunity to wander labs and see the things that exist in everyday labs, they seem very well equipped to other countries, even major developed science nations. The whole range of access, people tend to be very impressed by that.

> *"Kansai is one of the world's big science and research centres."*

HOW ABOUT SCIENCE IN KANSAI?

In terms of the science strengths in Kansai, when we bring people over from the UK, we don't bring them over to look at Kansai as a whole, we bring people over for specific subject areas. We've run a number of projects and built relationships in a number of specific areas that are very strong in Kansai. Robotics is one them. Energy storage and battery technologies. Pharmaceuticals. Various aspects of biological research. Quite a broad range of biological research actually. From where we sit, Kansai is one of the world's big science and research centres. It's got a number of terribly strong academic institutions and organizations like Kyoto [University] and Osaka [University], Riken, NAIST. These are among the top performing research institutions in all of Asia. And within the same region you have companies like Panasonic, Nintendo, Takeda, Sysmex. That combination of both the academic and industrial R&D within the region makes it very strong globally.

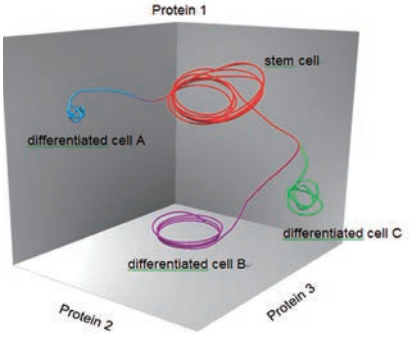
Community Work

In December of last year, Takehiro Kawano of QBiC was contacted by Mitsuko Kudo of the Rikkyo University School of Science to talk science and art. Prof. Kudo has been working with Prof. Masashi Kimura of the Nihon University School of Art to make a unique science communication design course that brings science and art students together, a rare event in Japan, to develop creative expressions that convey science. Prof. Kudo was looking for a new biological theme and decided QBiC was a good place to consult. Takehiro proposed "the robustness of life" and worked with students to make an interactive application that used fashion to demonstrate how an organism adapts its physical state to its environment. This same application was used last January to showcase QBiC at the 5th annual Hyogo Science Fair, where students from nearly 40 high schools shared posters and presentations about their experiments. The event also hosted over 50 universities, research centres, and companies that attended to promote themselves and science. The game, and by extension QBiC, was a big hit among the high school girls. But could a game explaining robustness using fashion appeal to the boys? "It seems so", says Takehrio. "They were at first looking from behind, but eventually everyone wanted to try". Over 150 students visited the booth, making it the most popular at the event.

Meet the QBiC Lab . . .

Chikara Furusawa and the Laboratory for Multiscale Biosystem Dynamics

Biological systems generally have multiple hierarchies, from molecules to cells, individuals to communities. Using a combination of experimental and theoretical approaches, the Multiscale Biosystems Dynamics Group, led by Chikara Furusawa, aims to understand the universal laws that regulate these multiple hierarchies. The group has two specific interests. The first is the dynamics of adaptive evolution. By studying the evolution of E. coli cells experimentally and in silico organisms using simulations, they investigate the interplay between phenotypes and genotypes to understand the nature of robust adaptive dynamics. The second considers the differentiation dynamics of stem cells. Computer simulations of developmental processes suggest that an attractor representing the expression dynamics of a stem cell requires an oscillatory nature to maintain multi-potency (see image). This prediction is now under investigation in collaboration with other QBiC teams with the expectation of clarifying how the robustness of multicellular systems is maintained at the cellular level.



The OLABB Seminars

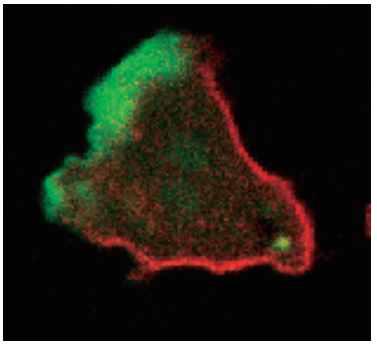
Chikara Furusawa has been organizing research seminars at the OLABB (the QBiC Osaka site) for the better part of a year now to promote collaborative projects. The seminars are designed similar to lab meetings, where a selected researcher gives a 30 minute talk of his/her work followed by a 30 minute discussion. The seminars are welcome to all, including researchers external to QBiC, as scientists at the nearby Immunology Frontier Research Center, one of Japan's World Premier Institutes, regularly participate. For this reason, the data shown is to the discretion of the presenter. To facilitate better communication, seminars have been divided into two streams, English and Japanese, with each held weekly.

Paper Highlight

A quantitative technique for analyzing the shuttling of molecules between the cytoplasm and membrane.

The transduction of signaling molecules inside a cell normally involves molecules shuttling between the membrane and cytoplasm. Precise shuttling is a spatial-temporal problem, as the signaling molecule must reach its proper destination at the proper time in order to regulate the cell correctly. Most studies investigating this phenomenon have separated the analysis exclusively into a spatial analysis, which can only consider the diffusion mobility and provide information on the state of the molecule and to which molecules it is bound, or a temporal analysis, which can only consider the reaction kinetics of the transitions between states. The Laboratory for Cell Signaling Dynamics has published a new method, lifetime-diffusion analysis, that does both simultaneoulsy. The report can be seen in *PLOS Computational Biology* and is first authored by Satomi Matsuoka.

Lifetime-diffusion analysis is an extension of the lab's analysis technique for describing molecular states on the membrane first reported in 2009. That technique only considered state transitions while a molecule was bound to the membrane. The current method goes beyond by revealing state transition kinetics and membrane-binding lifetimes of single molecules that shuttle between the membrane and cytoplasm. Here, they applied their method to the study of PTEN, a PtdIns(3,4,5)P_3 phosphatase, tumor suppressor, and chemotactic signal.



Single molecule imaging indicated that PTEN behavior depends on its location inside a *Dictyostelium* cell, as it had both faster membrane dissociation and lateral diffusion when localized in the pseudopod than in the tail (green and red in cell, respectively). Lifetime-diffusion analysis was applied to build a model describing the kinetics states, estimating that three best describes the data. The analysis was done in three steps. In the first, membrane dissociation was evaluated by comparing the disappearance rate of single-molecule fluorescence with the photobleaching rate. Then, the minimum number of states PTEN takes was determined by applying the Akaike Information Criterion to the point distribution function. Finally, state transitions were determined by observing the rate at which the state subpopulations decreased.

The three states can be distinguished by their membrane affinity. At the extremes were a strong membrane-bound state and a weak membrane-bound state. The former would almost always transition to another state before PTEN dissociation from the membrane, while the latter would almost always result in PTEN dissociation without any state transition. The third state was the most populated of the three and therefore deemed the primary state. Despite the existence of the weak-binding state, PTEN is more likely to dissociate from the membrane when in the primary state. The existence of the weak membrane-bound state is a bit of an enigma then, since this is not a preferred pathway for PTEN to enter the cytoplasm. Satomi does not have any data to support her theory, but speculates that the weak-binding state

may represent a PTEN subunit that does not dissociate properly from the initial dissociation transition of the primary state.

The subpopulations of these states varied with the location of the cell. The strong binding state, for example, occurred twice as frequently in the tail than it did in the pseudopod, consistent with the aforementioned imaging results that showed PTEN was far more mobile in the pseudopod. The analysis indicated that the state transitions are one reason for the local imbalance in subpopulations, with a rate transition from the primary state to strong state being almost double in the tail than that in the pseudopod.

The result of the analysis is a quantitative explanation for the asymmetrical distribution of PTEN inside a chemotactic cell. The existence of the strong state may suggest the existence of a yet unidentified membrane protein that interacts with and strengthens the membrane association of PTEN. Satomi is now searching for this protein. “I am interested in how PTEN is localized. I made lifetime-diffusion analysis because we needed new analysis tools.” She has therefore since shifted from single molecule techniques to biochemical ones, leaving others to benefit from her new analysis method.

IPA at QBiC

Riken International Program Associates (IPA) are Ph. D. students at partnering universities who earn their degrees while conducting their research at a Riken centre. Established IPA agreements have recently brought two students from overseas institutes to QBiC. Satya Arjunan at the Laboratory for Biochemical Simulation worked with his Team Leader, Koichi Takahashi, who Satya affectionately yet inexplicably calls Shafi, to sign an IPA agreement with the University of Malaya from where Nicholas Chin Yin Fai has just arrived to begin a 3-year stay. Urs Frey, Team Leader of the Initiative Research Unit, worked with his Ph.D. mentor and colleague, Martin Hierlmann, to set up an IPA agreement with ETZ Zurich, which brought Alexandra Dudina for her Ph.D. studies to QBiC just before the turn of the year. While IPA are limited to Ph.D. students at partnering universities, anyone interested in a short-term research project at QBiC (less than one year) is still encouraged to contact us.

Do you enjoy photography?

QBiTs is searching for a volunteer photographer.

The photographer will have tremendous independence on the selection of photos used for the newsletter. The only qualification necessary is the ability to take portrait shots better than our previous photographer (an example is shown below).

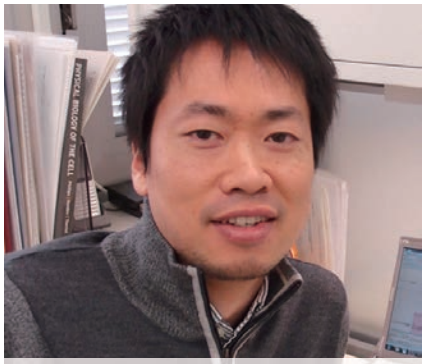
Want to join QBiC?

Please see our website

http://www.qbic.riken.jp

for the latest job opportunities

QBiC working overseas



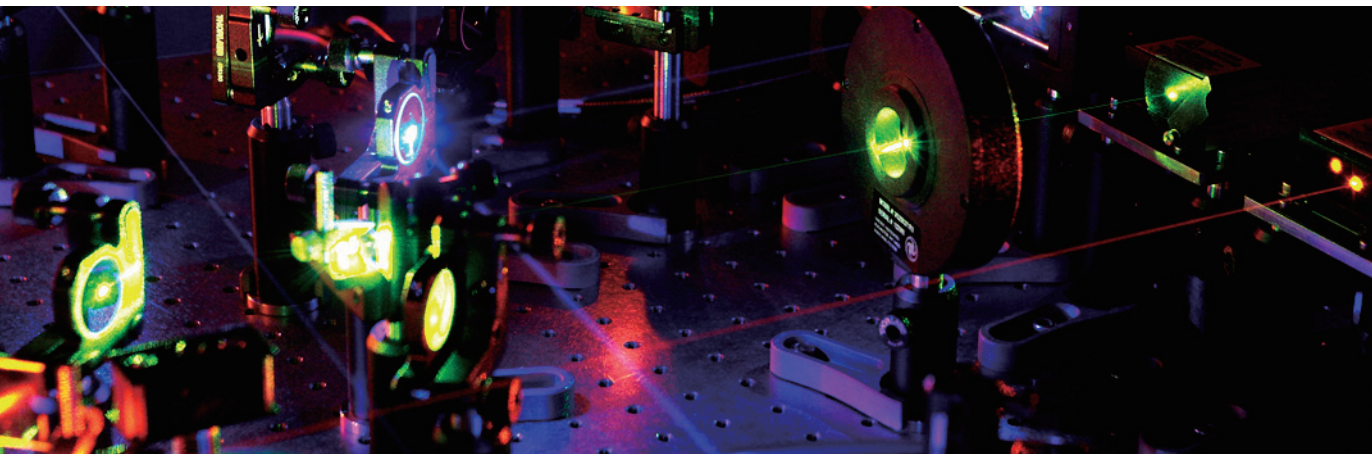
Mitsuhiro Iwaki

A little over two years ago, QBiC's Mitsuhiro Iwaki of the Laboratory for Cell Observation Dynamics met William Shih of Harvard University, a pioneer of DNA origami. Until then, Mitsuhiro had spent the bulk of his research career studying single myosin molecules using imaging techniques, but wanted to expand his research to the study of intermolecular communication and cooperation. The DNA origami tools at Shih's lab were just the techniques he needed. DNA origami has allowed him to branch far beyond myosin, as he is now looking at fundamental questions about the central dogma. "I am happy with my understanding of myosin and want to move onto other projects". Mitsuhiro has already visited the Shih lab four times the last two years to work with Dr. Shelley Wickham and learn about DNA origami. Seeking to improve his yields and make even more complex folding patterns, he plans to visit again this year with the aim of eventually building a DNA origami laboratory at QBiC. Details can be seen at
http://www.qbic.riken.jp/cdo/iwaki-subg/index.html

Unlike Mitsuhiro, Takaharu Mori, a post-doctorate at the Laboratory for Biomolecular Function Simulation (Yuji Sugita), travelled to Michigan State University (MSU) last autumn not to diversify his research, but to intensify it. His one month there was in response to a collaboration with Michael Feig, a professor at MSU and expert in molecular simulations, who spent his sabbatical working in the Sugita lab on cellular-scale simulations, but returned to the United States in September with the project incomplete. A number of Skype conversations left the two groups realizing that all would benefit if Takaharu visited East Lansing, Michigan.

In the short time, Takaharu and Prof. Feig were able to solve all the bugs they needed in their simulation program. Takaharu will be returning again this spring for a one-year project. Although Takaharu describes East Lansing as a remote place, he does think there are opportunities there that go beyond science. "Inside the campus there is a golf course. I like watching golf, but have never actually done it."

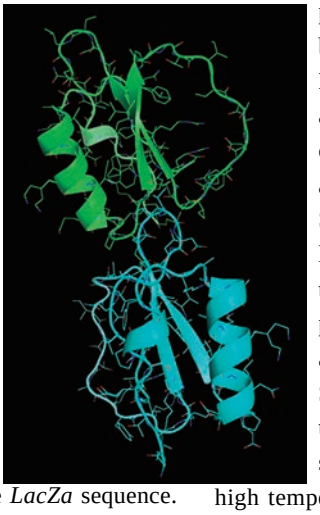
Takaharu Mori



Briefs

New ways to measure TALEN activity

The Laboratory for Cardiovascular Molecular Dynamics has published two papers that describe new methods for measuring the quality of transcription activator-like effector nucleases (TALEN) when designing KO animals. TALEN work by creating double strand breaks (DSB) in the DNA that are then repaired by non-homologous end joining (NHEJ) to result in desired mutations. The difference between TALEN with high and low activities has a great impact on the quality of the KO animal and impending experiments. The first method, first-authored by Yu Hisano and reported in *Biology Open*, describes the LacZ recovery/disruption method, which quantitatively measures TALEN-induced frameshifts in an endogenous target loci. Here, genomic DNA from TALEN-treated embryos is inserted into the *LacZa* sequence. Colonies with this sequence are then grown, and the resulting ratio of blue to white colonies is measured. The method is of use in the early stages of KO-animal production, as it evaluates the viability of the TALEN. The second method, first-authored by Satoshi Ota and seen in *Gene to Cell*, is a qualitative one and comes later in the KO production process. According to Team Leader Atsuo Kawahara, this method is technically no more advanced than existing ones. It takes advantage of the heteroduplex mobility assay, which is more commonly used for strain variants in viruses, but importantly substitutes acrylamide gels for agarose ones. This switch enables investigators to distinguish sequence differences caused by TALEN activity at the target genome sites.



The Thermodynamics of Protein Folding

One of the challenges when studying protein structure and stability in situ is the incorporation of cellular crowding effects. From a thermodynamics perspective, these effects have traditionally been attributed to entropic contributions. However, there has been a recent push arguing that enthalpy deserves more consideration. The sabbatical by Prof. Feig at the Laboratory for Biomolecular Function Simulation(see QBiC working overseas) has led to stronger evidence showing this to be the case. Investigating interactions between protein G and villin using MD simulations and NMR experiments, Profs. Feig and Sugita show that villin is especially sensitive to crowding, and that the resulting denatured states are distinct from those caused by high temperature or ionic conditions. Energetically, partially unfolded states of villin in the presence of protein G are stable, because although the surface area of villin exposed to a solvent increases in isolation, the overall exposed surface area actually decreases due to its interactions with protein G. These results would argue that entropy makes a lesser contribution to the thermodynamics of the state stability than enthalpy. The results are described in *the Journal of the American Chemical Society*.

New QBiC lab

Takanori Kigawa, an expert in NMR, has officially joined QBiC this month to commence the Laboratory for Biomolecular Structure and Dynamics. He has spent more than a decade building his facilities at Riken Yokohama, where he will physically remain with his 10 researchers to study macromolecular crowding, especially the dynamics of and interactions between corresponding molecules.

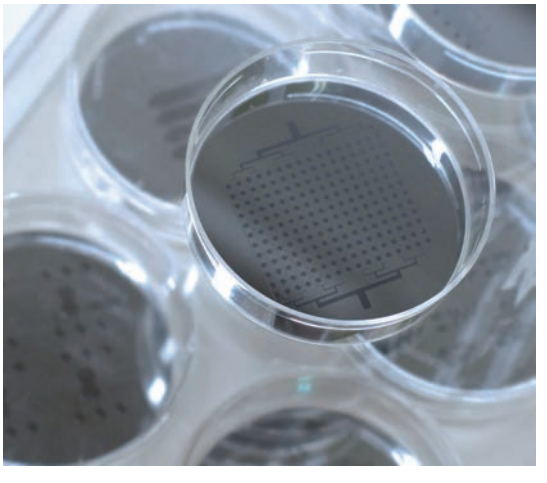
Interesting People

Hiroyuki Moriguchi takes us to Electric Ladyland

Hiroyuki Moriguchi has one of those stories that people in Kansai love to hear. Despite a promising career at Tokyo University for six years, he decided the charms of the Osaka-Kobe area were too great and started looking for work there. He found it the end of 2011, when he discovered Yo Tanaka was also leaving Tokyo to start the Laboratory for Integrated Biodevices at QBiC. “The first time I learned of Yo Tanaka’s work was through a job posting on the internet. It all happened very fast”. The interview came soon after, and by the following April Hiroyuki was in Kobe. The Tanaka group is small – it researchers consists of just Yo and Hiroyuki, both specialists in the fabrication of devices that can be used for better cell cultures and other instrumentation: Yo working on glass materials devices and Hiroyuki on soft materials like gels and silicon. These devices drive a number of collaborations within QBiC. “We work very closely with [QBiC Group Director] Hiroki Ueda. He was even at the interview”.

Hiroyuki’s career in the sciences came from a childhood fascination with nature. He had made a habit of collecting bugs, fish and even turtles at home. It was this passion that drew him to study biology at university. That and Harrison Ford. “I wanted to be like Indiana Jones. Because he was a professor of archaeology, I thought academics was the way to go”. Although probably not completely forthright, Hiroyuki claims it was not until his graduate student years that he realized his career would never require he wear a hat and whip.

That spirit of adventure may have been at its peak when Hiroyuki was 15. Despite being a studious and disciplined teenager, he did something more typical of an incorrigible youth: he ran away from home. The reason was he had become exhausted by the notoriously intense preparation for Japanese university entrance exams, which were still three years away. Wanting to escape, he took his savings and bought a ticket for an overnight fairy to Oita, a city on the northeast coast of Kyushu. It was as intricate a plan as one could expect from someone that age. Hiroyuki’s goal was to get somewhere warm, as his lack of savings required he be frugal, and the warm weather meant he could live outside and eat from the fields. He claims he had not told a soul of his intentions, not even a friend. Nevertheless, he left a polite note on his desk, “Please do not search for me”. Guilt, however, caused him to call home. It was when hearing his mother’s voice that sentimentality overtook rebellion, and after only half a day in Oita he was heading back to Osaka by boat. It was there he saw a man he still remembers. “He was an older gentleman holding a guitar case. It was a very cool look”. So cool that Hiroyuki started learning the guitar upon his return. Despite his hours at the lab, he manages to find enough time to jam and even performs Jimi Hendrix covers in local bars. “I wanted to be a rock star,” is how Hiroyuki explains he felt when he first picked up the guitar. Unlike Indiana Jones, that dream remains.



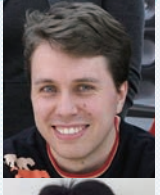
The QBiC Spring Course

The second QBiC Spring Course happened last month, entailing two days of lectures and two days of lab practicals. The course is a national-wide recruitment effort, targeting undergraduates. This year 92 students, from those studying physics in Tokyo to those studying biology in Tottori, attended. While last year's course was at Riken, this year's was held at the Center for Information and Neural Networks (CiNet) to inaugurate CiNet's new building, which is located on the Osaka University campus and is next to where ground is to break for a new QBiC building that is expected to be complete before the end of 2014. Director Toshio Yanagida views CiNet an excellent collaborative partner and used the event as a public gesture to demonstrate his commitment to the relationship. CiNet aims to build better communication systems by understanding how the brain uses information networks. Similarly, QBiC seeks to understand how the cell uses information networks, which makes the brain and cell analogous instruments of different scales. For many students, the course offered a first opportunity to tinker with live-cell microscopy and other advanced technologies. In the end, all were so thoroughly satisfied that no one remarked about the event inappropriately being named "QBiC Spring Course" despite happening one week before the official end of winter.

Newcomers at QBiC

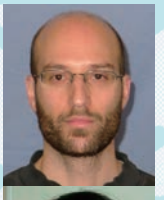
Me: Rika Kawaguchi
Lab: Team Yanagida
Hobbies:Soap making
Cheers:
HANSHIN TIGERS

Me: Ryoko Tanaka
Lab: Team Takahashi
Hobbies: Photo,
Classical music
Cheers:
HANSHIN TIGERS



Me: Simon LeClerc
Lab: Team Taniguchi
Hobbies: Trekking (cities and mountains), biking
Cheers:
HANSHIN TIGERS

Me: Akira Ogawa
Lab: Team Onami
Hobbies:Jazz
Cheers: Yomiuri Giants



Me: Hadi Izadi
Lab: Team Frey
Hobbies: Hockey, Nature, Photography
Cheers:
Free Agent Fan

Me: Hanae Shimo
Lab: Team Takahashi
Hobbies Travelling, Guitar
Cheers:
Free Agent Fan

Me:
Hiroaki Machiyama
Lab: Team Watanabe
Hobbies: Volley Ball
Cheers:
Chunichi Dragons

Me: Itsue Hirano
Lab: Team Office
Hobbies: Shochu, Wine
Cheers:
HANSHIN TIGERS

QBiC Rock Climbers

Bouldering is a simple form of rock climbing that is easy to begin, highly social and a thorough whole-body exercise, from the square of your back to the tips of your fingers. Historically, rock climbers used bouldering to hone their skill and strength for the difficult parts of longer roped climbs. It has since gained popularity, especially in Japan where a number of clubs have sprouted in recent years. Taking advantage, Eri Nishihara, QBiC's own spiderwoman, has been organizing regular trips to a local one. Try it, and discover just how much strength you have in your little pinky.

We are now on the web!

Download past issues of QBITs at
http://www.qbic.riken.jp/

MISSING BICYCLE

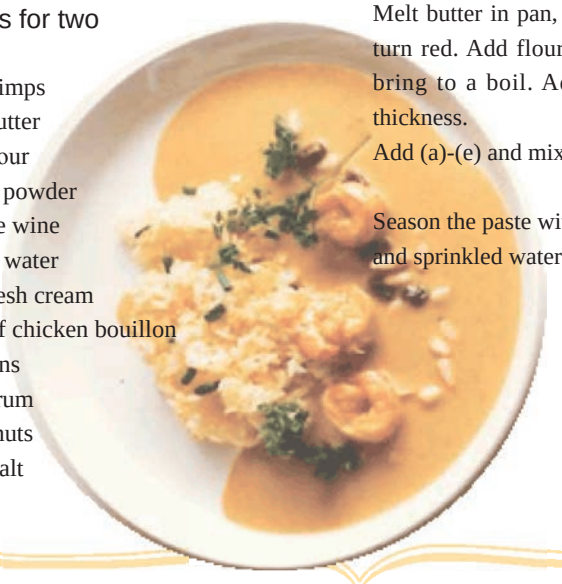
Bianchi Metropoli (white). Last seen in March. This bicycle belongs to a QBiC member. Either got lost on its own or was taken. If anyone has seen it, please write to QBiTs@riken.jp

THE CHOW DOWN

Shrimp curry sauce w/ saffron rice

Ingredients for two

100 g of shrimps
1 1/2 tbsp butter
1 1/2 tbsp flour
1 tbsp curry powder
2 tbsp white wine
1 1/3 cup of water
(a) 2 tbsp fresh cream
(b) 1 cube of chicken bouillon
(c) 20g raisins
(d) 2 tsp of rum
(e) 5g pine nuts
A pinch of salt



Melt butter in pan, and saute the shrimps until they turn red. Add flour, curry powder, white wine and bring to a boil. Add water slowly to change the thickness.
Add (a)-(e) and mix untl the bouillon dissolves

Season the paste with salt and serve with saffron rice and sprinkled watercress.

Sila Menjamu Selera!
(マレー語で「いただきます」)

Have a recipe you want to share, contact us at:
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