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## A Japanese PI in Switzerland

By Kentaro Shimizu, University of Zurich

One of the challenges of working in science is that you never know where you will live and I never imagined that I would live in Switzerland. During my undergraduate study at Kyoto University, Japan, I had the opportunity to attend a Summer Institute at the Weizmann Institute in Israel to study the EGF signaling pathway. I then traveled throughout Europe with a Eurail pass for 15 days. In Zurich, I became lost. I had no map but the people kindly told me how to take trams and trains. This was my first and very positive experience of life in Switzerland.

Towards the end of my postdoctoral training in the USA, I applied for Principal Investigator (PI) positions all over the world and was excited to accept an Assistant Professorship position at the University of Zurich for a new University Research Priority Program on Systems Biology/Functional Genomics. Except from my experience as a tourist, I did not know much about life in Switzerland or Swiss science at that time but I learned from a Nature column that Switzerland was recruiting young researchers from all over the world (Schiermeier, Nature 435, p. 532, 2005). The very first sentences were: ‘Ursula R othlisberger is in a minority at the Swiss Federal Institute of Technology in Lausanne (EPFL). That she is a woman and a young scientist leading her own independent group is not unusual. Rather, what makes her stand out is that she is Swiss.’ I never felt out of place because I am Japanese and in my current institute there are over 20 nationalities just on my floor. The language at faculty meetings was changed from German to English to integrate all the foreign faculty members.

In Japan there is a growing concern that young scientists are no longer inclined to work abroad for a variety of reasons. After several years in Switzerland I know how important it is to experience life and work abroad. Therefore I was happy to accept an invitation to an HFSP luncheon seminar during the 35th Annual Meeting of the Molecular Biology Society of Japan, organized by Tadashi Uemura and Gohta Goshima,

to speak to young Japanese scientists about my research experience in foreign countries. HFSP support is a rare and therefore unique funding mechanism to provide opportunities for intercontinental scientific collaboration. A Japanese saying can be applied to my situation: ‘Third time paid for all’ – meaning two unsuccessful applications for an HFSP grant should not prevent trying again with a new team. Moreover, I am now in the privileged position of supervisor of Ulises Rosas, an HFSP fellow. I really would like to encourage young scientists to keep trying and not give up.

Sometimes the twists and turns of a career are marked by coincidence. At the time when I received the offer from Zurich I was a member of the orchestra at North Carolina State University and we were playing symphony no. 4 by the Swiss composer Arthur Honegger, a member of the famous ‘Les Six’ whose portrait is featured on the 20 Francs note. And then I remember receiving a book from my postdoctoral supervisor, Prof. Purugganan: ‘A PhD is not enough!’ He gave this book to all postdocs and advised us that life as a PI would be exciting and also very different from postdoctoral work. As an established PI in Switzerland I agree with his advice and can honestly say that I have no regrets.



Kentaro Shimizu

In my research, I am interested in answering a fundamental question: how can some 20,000 genes generate the enormous biodiversity of millions of species? With the combination of the Swiss natural environment and an HFSP Young Investigator Grant, I am now enjoying my studies on the genetics of speciation. Speciation has been a central interest in biology since Darwin’s ‘Origin of Species’, but a major difficulty in studying speciation is that it usually occurred a long time ago. Thus, little information is available about the molecular and population processes and the environment at the time of speciation. Notably, in Switzerland, a textbook example of contemporary speciation of *Arabidopsis* relatives has been described. Farmers created a new habitat by clearing forests in the small village of Urnerboden at the beginning of the 20th century. Then *Cardamine amara* (2x, diploid),

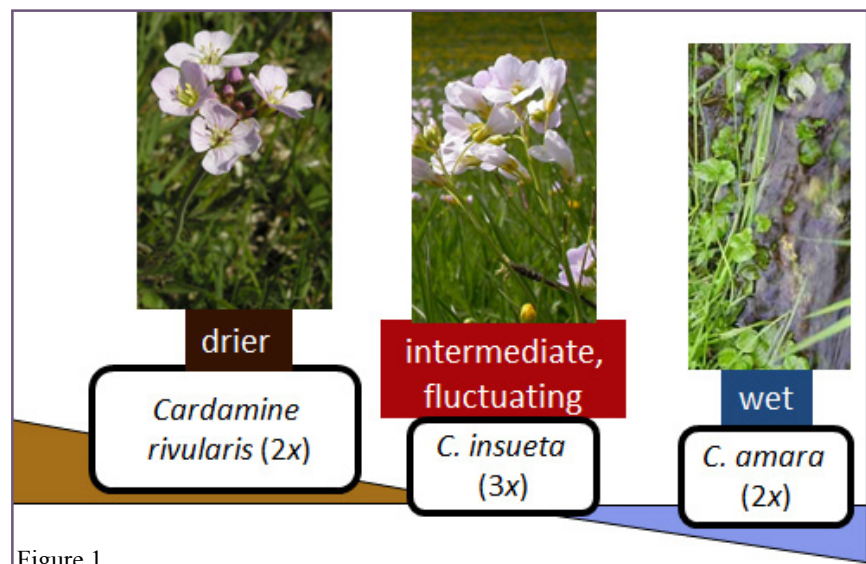


Figure 1

which lives in streams, hybridized with *C. rivularis* (2x), which lives in drier habitats. As a result, the new polyploid species *C. insueta* (3x) appeared in intermediate and fluctuating habitats such as hay meadows (Fig. 1) as well as another new polyploid, *C. schulzii* (6x). This is a rare example of a species that is known to have originated during the past 150 years around the world, and is probably the only one closely related to the model species *Arabidopsis*.

I started a collaboration with Dr. Jun Sese (Ochanomizu University and the Tokyo Institute of Technology) in network science and bioinformatics and with Dr. Angela Hay (University of Oxford, now Max Planck Institute for Plant Breeding Research in Cologne) in developmental and synthetic biology. We had the idea to investigate the question whether speciation by hybridization can be studied by analogy with network merging. Network merging is common in social networks, such as in the mergers & acquisitions (M&A) of companies. In M&A, a powerful leader could reorganize redundant components to increase efficiency. What happens in hybrid speciation, where two gene networks are merged by genome duplication? It somehow works well without external 'supervision' in a self-organized way, but very little is known about network merging in biology.

We were very excited that our interdisciplinary team was successful in securing an HFSP Young Investigator Grant. We started by establishing a new bioinformatic workflow to study the transcriptome in polyploid species. It has been very difficult to isolate and analyze duplicated genes (called homeologs) separately, because they are highly homologous by definition. We used next generation sequencing (NGS) to solve the issue, and Jun's group developed software named HomeoRoq (Homeolog Ratio and quantification). Using HomeoRoq, we suggest that subnetworks for stress responses that are unique to each parent may be safeguarded in polyploid species because of cis-regulatory divergence, thus allowing them to exploit fluctuating habitats. We also reported that hybridization occurred recurrently in Urnerboden in collaboration with cytologists, taxonomists and colleagues from the Geography and Environmental Sciences Division in Zurich.

In many ways 2014 is a special year because it marks the 150th anniversary of diplomatic relations between Switzerland and Japan. One of the numerous

commemorative events was the Swiss–Kyoto symposium in Zurich, which was attended by over 100 scientists from my alma mater, Kyoto University (Fig. 2). I am also very excited that the 25th anniversary of HFSP, a Program

started on the initiative of Japanese Prime Minister Mr. Nakasone, will be held in Switzerland in 2014 and I look forward to attending the HFSP Awardees Meeting in Lugano.



Figure 2. 150<sup>th</sup> Anniversary of Diplomatic Relations between Switzerland and Japan: Plant and Environment Session

## Congratulations to Torsten Wiesel



On June 3rd, 2014, former HFSP Secretary General Torsten Wiesel will celebrate his 90th birthday. From all of us at the Secretariat but also from the wider HFSP community, our warmest wishes for happiness and continued good health.