SEEDS

W woman tenure track II

Collection of Research SEEDS in Okayama University

—Woman Tenure Track version—

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Chair's message

Chair of the Organization for Diversity Management,
Director and Vice-president of Okayama University

Hirofumi Abe, Ph.D.

Okayama University devised the fundamental policy for promotion of gender equality that specified the first 5 months of the 2011 academic year as the planned period of implementation. The Office for the Promotion of Gender Equality took the initiative in facilitating the Woman Tenure-Track (WTT) system and promoted the employment of women faculty while striving to create a conducive work environment for everyone through activities concerning heightening diversity awareness and public relations. We welcomed the first group of women faculty through the WTT system in 2010. Since then, out of 16 women faculty who had been hired over the 5 terms, 7 women faculty successfully achieved tenure in the terms, I and II, respectively. Thanks to the tireless efforts of our women faculty and everyone involved in supporting the system, our administrators are very proud of the fact that our WTT system has gathered attention throughout the nation for its steady progress. Although this women friendly system is becoming established at our institution, there is still a long way toward achieving gender equality in Japanese academia. While the goal outlined in the fundamental policy for promotion of gender equality aims to raise the ratio of women faculty in natural science to 20% by the year 2018, as of May 1, 2014, women faculty across Japan remain to be only 15% of all faculty. When we received the funding for the Super Global Universities program, Okayama University established the 10 year goal of raising the ratio of women faculty to 25% by the year 2023. Thus, it is imperative that we continue to heighten our faculty's diversity awareness and engage in public relations activities. In order to achieve this ambitious goal, we earnestly hope that our WTT faculty would produce remarkable results in their research fields and become the leaders and role models for enhancing diversity at Okayama University. I sincerely ask for each and every one of the involved parties for their continued understanding and unwavering support for the WWT system.

March 2015

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Research topic

Research topic

Study on photosynthesis

Miho Nishimura

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[Research field] Molecular mechanism of photosynthesis

Curriculum vitae

- March 2007 Completed Biology Major, Graduate School of Natural Science and Technology, Okayama University (MC)
- April 2008 Research Fellowship (DC2), Japan Society for the Promotion of Science
- March 2010 Completed Bioscience major, Graduate School of Natural Science and Technology, Okayama University (DC)
- April 2010 Assistant professor of Bioscience (adjunct), Graduate School of Natural Science and Technology, Okayama University
- April 2013 Assistant professor of Bioscience, Graduate School of Natural Science

【Academic degree】Ph.D. (Science), Okayama University, 2010

Keywords

photosynthesis, plants, environmental stress, global warming

Publications

① Yoshioka M., Uchida S., Mori H., Komayama K., Ohira S., Morita N., Nakanishi T. and Yamamoto Y.: Quality control of Photosystem II: cleavage of reaction center D1 protein in spinach thylakoids by FtsH protease under moderate heat stress. The Journal of Biological Chemistry 281: 21660-21669 (2006).

② Yoshioka M., Nakayama Y., Yoshida M., Ohashi K., Morita N., Kobayashi H. and Yamamoto Y.: Quality control of photosystem II: FtsH hexamers are localized near photosystem II at grana for the swift repair of damage. The Journal of Biological Chemistry 285: 41972-41981 (2010).

③ Yoshioka-Nishimura M., Nanba D., Takaki T., Ohba C., Tsumura N., Morita N., Sakamoto H., Murata K. and Yamamoto Y.: Quality Control of Photosystem II: Direct imaging of the changes in the thylakoid structure and distribution of FtsH proteases in spinach chloroplasts under light stress. Plant and Cell Physiology 55: 1255-1265 (2014).

④ Yoshioka-Nishimura M. and Yamamoto Y.: Quality control of Photosystem II: The molecular basis for the action of FtsH protease and the dynamics of the thylakoid membranes. J Photochem Photobiol B: Biology 137: 100-106 (2014).

⑤ “Forefront of Photosynthesis Research and Industrial Applications” 71-78 (2014) (book) N.T.S.

Short pitch

I hope to elucidate the secrets of plants that photosynthesize efficiently without waste while adapting to the environment.

Mechanism of enduring and adapting to environmental stresses (mechanism of maintaining photosynthesis under harsh environments).

Reaction mechanisms of photosynthesis (analysis of photosynthesis proteins and structural changes in plants)

Highly efficient photosynthesis conditions (increased efficiency of CO_2 absorption and organic synthesis)

Based on 1-3, I aim to analyze environmental factors impacting photosynthesis, elucidate the molecular mechanisms of photosynthesis, and actualize highly efficient photosynthesis.

Research outline

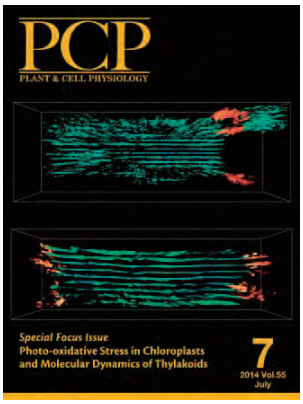
Strong sunlight and cold winter temperature that damage plants are referred to as environmental stresses. Plants are under certain types of environmental stresses year-round, and increasing temperature due to global warming is also a serious problem. I am conducting studies on the photosynthesis mechanisms of plants. I plan to elucidate the impacts of environmental stresses on plants, and the mechanisms that plants utilize to maintain photosynthesis while adapting to environmental changes. For experiments, I use higher plants and photosynthetic organisms such as *Chlamydomonas reinhardtii* that allow for genetic modifications.

Plant leaves. Photosynthesis takes place in chloroplasts.

Applicability of research

It is interesting that plants behave as if they had wills and feelings.

If the mechanism of photosynthesis by plants could be elucidated, not only genetic modifications, but also photosynthesis ability can be maximized with less burden on photosynthesizing organisms by such means as examining the growth conditions, etc. This could improve yield and the environmental adaptability of crops. Light, water, and carbon dioxides are used in photosynthesis to produce oxygen and organic matter, and this leads to significant changes in the energy industry. What I am working on is basic research, where culmination of small discoveries builds the foundation. Even a small discovery may be a seed for an idea in the eye of someone in a completely different field. I would like to conduct studies that could weave new ideas as follows:



Analyze unique structural changes in chloroplast thylakoid membrane using 3D imaging.

Short interview

Q. What made you choose your field and occupation?

When I was a freshman in college, a professor from the sciences was teaching a liberal-arts English class. Meeting this English teacher was the beginning. The way he chose English newspaper articles as teaching materials, and the way he talked about his love for painting, were entertaining, and that led me to choose his photosynthesis research laboratory.

Q. What is good for you as a faculty staff?

I think it's how we can easily get in touch with people from various fields and knowledge. The atmosphere of the university is similar to that of museums and art galleries, and I found it relaxing. Cooperation between the university and the local community is becoming more common, and I feel that I will be able to get involved with diverse activities.

Research topic

Physical property control of inorganic and organic thin films by electrostatic carrier doping

Ritsuko Eguchi

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[Research field] Solid-State Physics

Curriculum vitae

- March 2001 Completed Department of Applied Physics (MC) from the Graduate School of Engineering at the University of Tokyo
- March 2004 Completed Department of Applied Physics (DC) from the Graduate School of Engineering at the University of Tokyo
- March 2004 Research Fellowships for Young Scientists (PD), the Japan Society for the Promotion of Science
- April 2005 Quantum Electronic Materials Research Team (PD), RIKEN Harima Branch
- April 2007 Research Fellowships for Young Scientists (PD), the Japan Society for the Promotion of Science
- April 2010 Assistant Professor (Specially Appointed), Division of Chemistry and Biochemistry, Graduate School of Natural Science and Technology, Okayama University
- April 2013 Assistant Professor, , Division of Earth, Life, and Molecular Sciences, Graduate School of Natural Science and Technology, Okayama University

【Academic Degree】Ph.D. (Engineering), The University of Tokyo, 2004

Keywords

solid-state physics, organic device, superconductivity, photoemission spectroscopy

Publications

① Hideki Okamoto, Ritsuko Eguchi, Shino Hamao, Hidenori Goto, Kazuma Gotoh, Yusuke Sakai, Masanari Izumi, Yutaka Takaguchi, Shin Gohda, and Yoshihiro Kubozono: An Extended Phenacene-type Molecule, [8] Phenacene: Synthesis and Transistor Application. Sci. Rep. 4, 5330-1-8; DOI:10.1038/srep05330 (2014).

② Hideki Okamoto, Shino Hamao, Hidenori Goto, Yusuke Sakai, Masanari Izumi, Shin Gohda, Yoshihiro Kubozono, and Ritsuko Eguchi: Transistor application of alkyl-substituted picene. Sci. Rep. 4, 5048-1-6; DOI:10.1038/srep05048 (2014).

③ Ritsuko Eguchi, Xuexia He, Shino Hamao, Hidenori Goto, Hideki Okamoto, Shin Gohda, Kaori Sato and Yoshihiro Kubozono: Fabrication of high performance/highly functional field-effect transistor devices based on [6]phenacene thin films. Phys. Chem. Chem. Phys. 15, 20611-20617 (2013).

④ R. Eguchi, M. Senda, E. Uesugi, H. Goto, T. Kambe, T. Noji, Y. Koike, A. Fujiwara, and Y. Kubozono: Electric-Double-Layer Transistors with Thin Crystals of $FeSe_{1-x}Te_x$ (x = 0.9 and 1.0). Appl. Phys. Lett. 102, 103506-1-4 (2013).

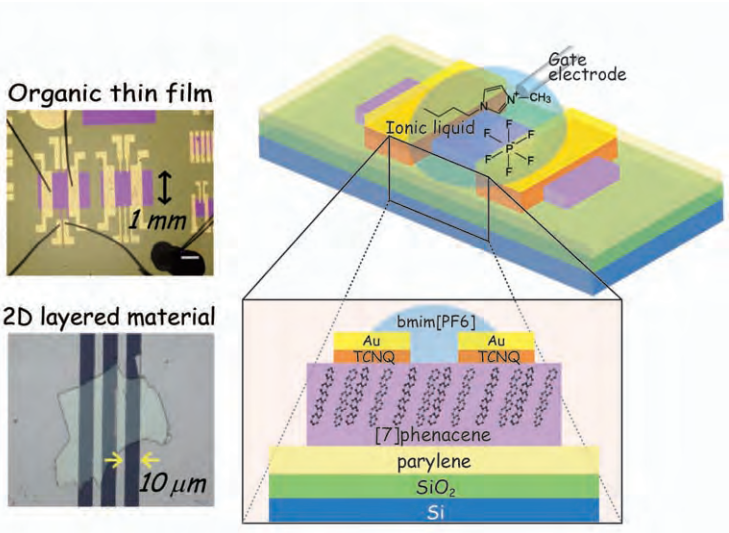
⑤ R. Eguchi, A. Chainani, M. Taguchi, M. Matsunami, Y. Ishida, K. Horiba, Y. Senba, H. Ohashi, and S. Shin: Fermi surfaces, electron-hole asymmetry, and correlation kink in a three-dimensional Fermi liquid $LaNiO_3$. Phys. Rev. B 79, 115122-1-6 (2009).

Short pitch

Prior to assuming my post at Okayama University, I was based at synchrotron radiation facilities and studied the electronic states of solids using photoemission spectroscopy. At Okayama University, I have been involved with research projects relating to such subjects as the fabrication of organic devices and field-effect transistors, which brought my work into new research fields. I intend to make new discoveries through the promotion of research projects that make use of a variety of experiments that draw on my past experiences. I hope to make significant strides with research efforts in order to further improve myself as a female researcher, while making serious efforts in conducting educational activities as a university faculty member.

Research outline

I am studying on field-effect transistor (FET) characteristics based on aromatic hydrocarbon thin films, as well as research intended to pave the way for the discovery of new physical properties for two-dimensional layered materials by electrostatic carrier doping. An issue with conventional organic thin-film FETs has been the low level of field-effect mobility in comparison with FETs created by using inorganic materials. Our research focuses on the phenacene-type molecules, which consist of a W-shaped fused configuration of benzene rings. We have revealed that FETs that utilize such molecules as the active layer indicate high mobility. This research aims to develop materials based on the foundation of electronics, and explores operating principles of FETs and fundamental properties of materials used as the active layer of FETs to promote research that merges material development and solid-state physics.



Device structure and photographs of single crystal and thin film field-effect transistors (FETs).

Applicability of research

FETs based on organic thin films make use of flexibility offered by organic materials and facilitate the creation of device structures even on soft materials, which makes them available for a variety of applications. There are cases where the FET characteristics vary depending on specific gases and on the properties of molecules used in the active layer. Such characteristics are utilized for applications in gas sensors and the like. The improvements of mobility and conductivity during operation, which are key to applications, are also important issues for this research. We seek out materials that indicate significant changes in physical properties, such as a material showing the insulating-to-superconducting transition, by using electrostatic carrier doping.

Short interview

Q. What is good for you as a faculty staff?

After I obtained my Ph.D. I worked in research institutions until I assumed my post at Okayama University. What I felt as I moved from research institutions to the university was an impression that can be considered obviously natural and that "the university is a lively place full of students". As a university faculty member, I am in the position of teaching, but I believe I am stimulated in many ways as I conduct education and research with students, and this is what I believe to be an "advantage".

Q. Please tell us about any personal difficulties you have experienced.

I resumed work after maternity leave and childcare leave that spanned more than a year. I am still faced with trial and error on a daily basis, as I struggle to maintain a balance between taking care of my child and work. There are occasionally instances where I get frightened as my child, who is one, bites a book or tries to stand by holding onto a shelf at the moment I focus my attention on my computer. I am aware of the fact that neither work nor taking care of a child is something that can be handled at leisure, and I expect I will need to overcome many obstacles, but the pleasure I gain from seeing my child grow will outweigh all such problems. I would like to wholeheartedly attempt to make great strides as a researcher myself, while my child grows.

Research topic

Exploring the physiology of the novel adrenomedullin hormones in vertebrates

Maho Ogoshi

[Affiliation] Graduate School of Natural Science and Technology (Faculty of Science)

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[Research field] Comparative endocrinology, zoology

Curriculum vitae

- Mar 2005 Master of Science, Department of Biological Sciences, Graduate School of Science, The University of Tokyo
- Mar 2008 Ph. D., Department of Biological Sciences, Graduate School of Science, The University of Tokyo
- Apr 2008 Global COE Researcher at Tokyo Institute of Technology, Graduate School of Bioscience and Biotechnology
- Apr 2009 Postdoctoral fellowship (JSPS) at Tokyo Institute of Technology, Graduate School of Bioscience and Biotechnology
- Apr 2010 Assistant Professor (WTT) at Graduate School of Natural Science and Technology, Okayama University
- Apr 2013 Assistant Professor at Graduate School of Natural Science and Technology, Okayama University,

【Academic degree】 Ph.D. (Science), The University of Tokyo, 2008

Keywords

Hormones, physiology, vertebrates

Publications

① Ogoshi, M., Kato, K., Sakamoto, T.: Effects of environmental salinity on expression of all the adrenomedullin genes suggest their osmoregulatory actions in the medaka, *Oryzias latipes*. Zoological Letters, 1:12 (2015).

② Takei, Y., Ogoshi, M., Nobata, S.: Exploring new CGRP family peptides and their receptors in vertebrates. Curr. Protein Pept. Sci., 14(4), 282-293 (2013).

③ Ogoshi, M., Kato, K., Takahashi, H., Ikeuchi, T., Abe, T., Sakamoto, T.: Growth, energetics and the cortisol-hepatic glucocorticoid receptor axis of medaka (*Oryzias latipes*) in various salinities. Gen. and Comp. Endocrinol. 178(2), 175-179 (2012).

④ Ogoshi, M., Nobata, S., Takei, Y.: Potent osmoregulatory actions of homologous adrenomedullins administered peripherally and centrally in eels. Am. J. Physiol. Regul. Integr. Comp. Physiol. 295(6), R2075-R2083 (2008).

⑤ Nobata, S., Ogoshi, M., Takei, Y.: Potent cardiovascular actions of homologous adrenomedullins in eels. Am. J. Physiol. Regul. Integr. Comp. Physiol. 294(5), R1544-R1553 (2008).

Short pitch

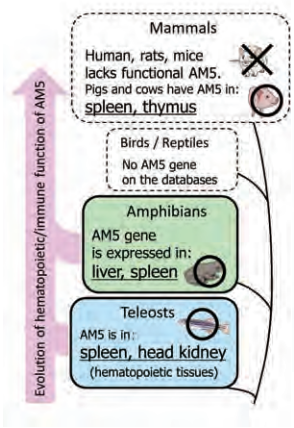
When studying hormones, mammals are oftenly used as a model because most of the studies are aimed to contribute to human medicine. However, some research using so-called ‘primitive’ animals can give rise to new findings in mammalian lineage. One of those findings was the discovery of adrenomedullin family members, which has been inspiring me to study them in non-mammalian species. My aim is to throw light on the basic characteristics of their action and the evolution of their function by the approach of comparative endocrinology.

Research outline

Adrenomedullin (AM) is a peptide hormone first identified in mammals. Our group have been identified that multiple AM genes exist in vertebrates, three in mammals and five in teleost fishes, and that they are related in body fluid regulation. However, the biological functions specific to each AM type are yet to be clarified. Our research aims to determine the function of newly identified AM types in vertebrates. We particularly focus on the AM5 which is mutated in human and rodents but expressed in the tissues involved in immunity/ hematopoiesis.

Applicability of research

This study focuses on the hormone of AM family which has been lost in the process of human evolution. By identifying its specific functions in the lineages that branched off before mammals, we aim to clarify the evolutionary history of vertebrates accompanied by the evolution of hormonal functions of AM family. Our research using amphibians, the ancestral lineage of tetrapods, will propose the unidentified functions of AM5 in mammals and further discussion why it is absent in several mammalian species. The function of AM5 may also be relevant to the field of human medical treatment.



Analysis of the function of AM5 in vertebrates

Short interview

Q. What made you choose your field and occupation?

I was always fond of animals and wanted to know more about them. That has prompted me to specialize in biology. As a graduate student I took part in the discovery of a new hormone and I was strongly impressed. And I was also kind of addicted to the experiments, each of them seems to be a small thing but gradually building them up will lead us to an interesting story. I hadn't given any particular thought about teaching before becoming a faculty member, and it is unexpectedly fun to teach.

Q. Please tell us about any personal difficulties you have experienced.

As many other researchers, I have to live apart from my husband. Yes this is a problem, but getting to know each other with my colleagues who are in similar situations is a great comfort to me.

Research topic

Effect of cancer on the intestinal tract and immune system

Junko Masuda

[Affiliation] Graduate School of Natural Science and Technology (Engineering)

[Position] Assistant Professor (adjunct)

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[Research field] Immuno-oncology

Curriculum vitae

- March 2002 Ochanomizu University Graduate School of Humanities and Sciences. Life Science (MC) graduate
- March 2005 Ochanomizu University Graduate School of Humanities and Sciences. Graduated with Majors in Human Environmental Sciences (DC)
- April 2005 Tokyo Women's Medical University; Assistant Professor
- May 2009 National Institute of Health (USA). Visiting researcher
- July 2012 RIKEN researcher
- April 2013 Okayama University Graduate School of Natural Sciences, Division of Chemical Bioengineering. Assistant Professor (adjunct)

【Academic degreee】 Ph.D. (Science), Ochanomizu University, 2005

Keywords

Immunology, oncology, biotechnology, molecular biology

Publications

① Yan T, Mizutani A, Chen L, Takaki M, Hiramoto Y, Matsuda S, Shigehiro T, Kasai T, Kudoh T, Murakami H, Masuda J, Hendrix MJ, Strizzi L, Salomon DS, Fu L, Seno M. Characterization of cancer stem-like cells derived from mouse induced pluripotent stem cells transformed by tumor-derived extracellular vesicles. J Cancer. 2014 Jul 5;5(7): 572-84. doi: 10.7150/jca.8865. eCollection 2014.

② Ieguchi K, Tomita T, Omori T, Komatsu A, Deguchi A, Masuda J, Duffy SL, Coulthard MG, Boyd A, Maru Y. ADAM12-cleaved ephrin-A1 contributes to lung metastasis. Oncogene. 2014 Apr 24;33(17):2179-90. doi: 10.1038/onc.2013.180. Epub 2013 May 20.

③ Koreishi M, Gniadek TJ, Yu S, Masuda J, Honjo Y, Satoh A. The golgin tether giantin regulates the secretory pathway by controlling stack organization within Golgi apparatus. PLoS One. 2013;8(3): e59821. doi: 10.1371/journal.pone.0059821. Epub 2013 Mar 21.

④ Yamazaki T*, Masuda J*, Omori T, Usui R, Akiyama H, Maru Y. EphA1 interacts with integrin-linked kinase and regulates cell morphology and motility. J Cell Sci. 2009 Jan 15;122 (Pt 2):243-55. *equal contribution

⑤ Masuda J, Usui R, Maru Y. Fibronectin type I repeat is a non-activating ligand for EPHA1 and inhibits ATF3-dependent angiogenesis. J Biol Chem. 2008;283(19):13148-55.

Short pitch

Owing to my experience as an Assistant Professor at universities and my study in the United States, I now have the opportunity to be a WTT professor at Okayama University. I am free to perform studies in a research environment. Also, as an educator, I would like to continue sharing the knowledge and experiences I have gained so far.

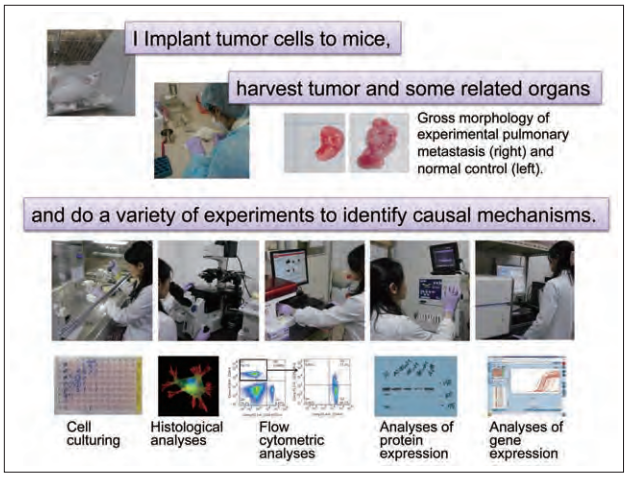
My Favorite Items

PIPETMAN pipette and the timer

I routinely use the Pipetman pipette and timer that aid in accurate sampling of small amounts of a solution and help to measure time, respectively.

Research outline

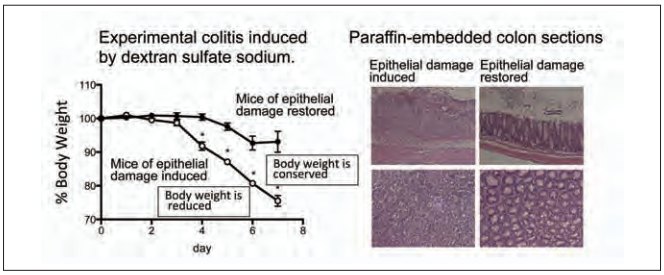
Chemotherapy is one of the three main treatments for cancer, and because anti-cancer agents can spread to the whole body via the blood, it has an excellent effect on cancer cells that are diffused throughout the body. However, side effects such as intestinal inflammation occur frequently, and sometimes, treatment has to be interrupted because of intestinal mucosal damage due to inflammation that causes deterioration of the patient's nutritional status and because of the large physical and psychological burden. Thus, I am currently researching options that can prevent intestinal mucosal damage, which is a typical side effect of chemotherapy, in order to continue the treatments while reducing the burden for the patient.



Schematic outline of the research and analytical methods

Applicability of research

I aim to ascertain the state of the intestinal mucosa when inflammation is less likely to occur during chemotherapy by determining the differences between healthy patients and those with cancer from an immunological point of view. Furthermore, clinical application of these results in the future will help improve the quality of life of cancer patients during chemotherapy and enhance their nutritional status.



The inflammatory condition of the intestines can be studied using mice that show variation in their body weight.

Short interview

Q. What made you choose your field and occupation?

In graduate school, I extensively studied change of maternal blood during the period from pregnancy to postpartum and earned my degree while engrossed in research. At times, I was mentally and physically exhausted, but the time spent was valuable and could only be experienced while in graduate school. I am still in contact with my guiding Professor from graduate school, and those experiences laid a solid platform for growth and development as a researcher.

Q. What is good for you as a faculty staff?

I can learn by guiding students. Although helping the students to understand the research and experimental methods requires time and effort, there is an exceptional sense of achievement when I recognize that the students have understood and grown.

Research topic

Study of global environmental changes using hermatypic corals

Mayuri Inoue

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[Research field] Geochemistry, paleoenvironment

Curriculum vitae

- March 2002 Completed Social Studies Major, Graduate School of Education Master's Program, Okayama University (MC)
- March 2005 Completed major in Department of Earth Sciences, Graduate School of Sciences, Tohoku University (DC)
- April 2005 Research Fellowship (PD), Japan Society for the Promotion of Science
- February 2007 Assistant professor, Ocean Research Institute, The University of Tokyo
- April 2010 Assistant professor, Atmosphere and Ocean Research Institute, The University of Tokyo
- April 2014 Assistant professor (adjunct), Earth Life Sciences, Graduate School of Natural Science and Technology, Okayama University

【Academic degree】Ph.D. (Science), Tohoku University, 2005

Keywords

Coral skeleton, carbonates, environmental changes, trace elements, isotopes, biomineralization

Publications

① Tanaka, Y., Iguchi, A., Nishida, K., Inoue, M., Nakamura, T., Suzuki, A. and Sakai, K.: Nutrient availability affects the response of juvenile corals and the endosymbionts to ocean acidification. Limnology and Oceanography 59: 1468-1476 (2014).

② Felis, T., McGregor, H. V., Linsley, B. K., Tudhope, A. W., Gagan, M. K., Suzuki, A., Inoue, M., Thomas, A. L., Esat, T. M., Thompson, W. G., Tiwari, M., Potts, D. C., Mudelsee, M., Yokoyama, Y. and Webster, J. M.: Intensification of the meridional temperature gradient in the Great Barrier Reef following the Last Glacial Maximum. Nature Communications 5: 4102, doi: 10.1038/ncomms5102 (2014).

③ Inoue, M., Ishikawa, D., Miyaji, T., Yamazaki, A., Suzuki, A., Yamano, H., Kawahata, H. and Watanabe, T.: Evaluation of Mn and Fe in coral skeletons (*Porites* spp.) as proxies for sediment loading and reconstruction of 50 yrs of land use on Ishigaki Island, Japan. Coral Reefs 33: 363-373 (2014).

④ Shinzato, C., Inoue, M., Kusakabe, M. A Snapshot of a Coral "Holobiont": A Transcriptome Assembly of the Scleractinian Coral, Porites, Captures a Wide Variety of Genes from Both the Host and Symbiotic Zooxanthellae. PLoS ONE 9 (1): e85182. doi:10.1371/journal.pone.0085182 (2014).

⑤ Inoue, M., Suwa, R., Suzuki, A., Sakai, K. and Kawahata, H. Effects of seawater pH on growth and skeletal U/Ca ratios of *Acropora digitifera* coral polyps. Geophysical Research Letters, 38, L12809, doi:10.1029/2011GL047786 (2011).

Short pitch

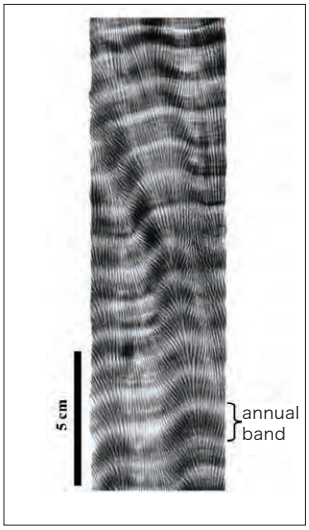
The Earth is dynamic yet delicate. It is quite attractive to me. Just as one thinks about a society by learning Japanese and World histories, when thinking about nature, one must learn the history of the Earth as a planet, and consider current and future natural environments. Researchers associated with Earth Sciences often require precision in their experiments. But when considering the obtained data, one must think on a sufficiently large scale, both temporally and spatially. I find this process interesting. I hope to share with as many people as possible the joy and importance of studying the Earth through my own research.

Research outline

In recent years, there has been much concern over problems with environmental changes. However, the Earth's environment has always changed. What types of mechanisms were involved in such changes? What impacts did these changes have on the environment of Earth's surface layer? I am conducting research with coral skeleton samples and geochemical methods in order to answer these questions. Furthermore, coral skeletons are important as paleoclimatic and paleooceanographic samples, and also in supporting biological diversities. I am studying the growth of such coral skeletons and biomineralization by organisms that form carbonates such as corals.

Applicability of research

We are concerned how the current climate and future changes take place. However, to improve the precision of climate change prediction, detailed actual data are needed. Paleoclimate and paleooceanography research is able to provide data. In particular, tropical and subtropical data are rare compared to data from higher latitudes; thus, research using corals is expected to fill the data gaps. In addition, if we knew the calcification mechanism of corals, we would be able to predict the changes in coral reefs in response to future environmental changes, and specific proposals could be made for transplanting of corals and protection activities.



Short interview

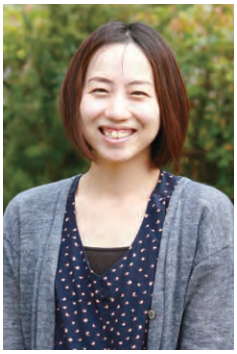
Q. What made you choose your field and occupation?

Firstly, I took a geography class in high school. The lectures had a mixture of students who did not know each other, and since my last name "Inoue" starts with the second letter of the Japanese syllabary, I was always sitting up front and the teacher always asked me questions. Since none of my friends were in the class, and I was too shy to make any mistakes, I prepared for the classes so hard that I ended up liking the class.

Secondly, I was watching news on the Nobel Prize when I was small and thought "There are so many amazing people around the world. I bet there is nothing we don't know any more". But when I was in graduate school, I realized that "the world is full of unknowns". That was when I found research and studying, I mean, knowing and learning something, and thinking on my own, to be fun.

Research topic

Investigation of the effect and mechanism of action of aromatherapy on respiratory tract inflammation in patients with bronchial asthma



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[Research field] Immunological Laboratory Science

Curriculum vitae

- March 2005 Graduate (MC), Okayama University Graduate School of Health Sciences
- April 2005 Clinical Laboratory Technician, Okayama University Hospital, Division of Medical Support, Inspection Department
- May 2007 Clinical Laboratory Technician, Okayama University Graduate School of Medicine, Dentistry and Pharmaceutical Sciences, Department of Obstetrics and Gynecology
- March 2008 Graduate (DC), Okayama University Graduate School of Health Sciences
- April 2011 Assistant Professor in Health Sciences, Okayama University Graduate School of Health Sciences (adjunct)
- April 2014 Assistant Professor in Health Sciences, Okayama University Graduate School of Health Sciences

【Academic degree】Ph.D. (Health sciences), Okayama University, 2008

Keywords

Complementary and alternative medicine, aromatherapy, exhaled breath condensate

Publications

① Ueno-Iio, T., Shibakura, M., Yokota, K., Aoe, M., Hyoda, T., Shinohata, R., Kanehiro, A., Tanimoto, M. and Kataoka, M.: Lavender essential oil inhalation suppresses allergic airway inflammation and mucous cell hyperplasia in a murine model of asthma. Life Sciences 108(2), 109-115 (2014).

② Ueno-Iio, T., Shibakura, M., Iio, K., Tanimoto, Y., Kanehiro, A., Tanimoto, M. and Kataoka, M.: Effect of fudosteine, a cysteine derivative, on airway hyperresponsiveness, inflammation, and remodeling in a murine model of asthma. Life Sciences 92(20-21), 1015-1023 (2013).

③ Iio, K., Ueno Iio, T., Okui, Y., Ichikawa, H., Tanimoto, Y., Miyahara, N., Kanehiro, A., Tanimoto, M., Nakata, Y. and Kataoka, M.: Experimental pulmonary granuloma mimicking sarcoidosis induced by Propionibacterium acnes in mice. Acta Med Okayama 64(2), 75-83 (2010).

④ Ueno, T., Kataoka, M., Hirano, A., Iio, K., Tanimoto, Y., Kanehiro, A., Okada, C., Soda, R., Takahashi, K. and Tanimoto, M.: Inflammatory markers in exhaled breath condensates from patients with asthma. Respirology 13(5), 654-663 (2008).

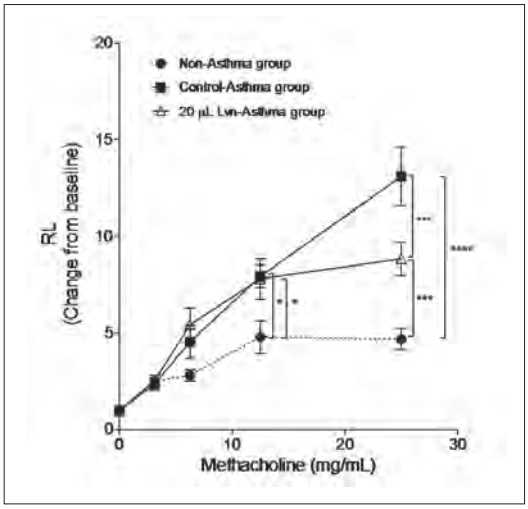
Short pitch

Aromatherapy, classified as complementary and alternative medicine, has garnered much attention in recent years. Although approximately 300 types of essential oils are used in aromatherapy, their scientific mechanism of action is poorly elucidated. In these studies, I investigated the anti-allergic effect of essential oils using a murine model of asthma. To further elucidate the mechanism of action, I will develop novel effective and safe methods of usage of essential oils after conducting human trials. The data obtained from these studies will aid in promoting health in daily life via aromatherapy as one of the complementary and alternative medicines used.

Research outline

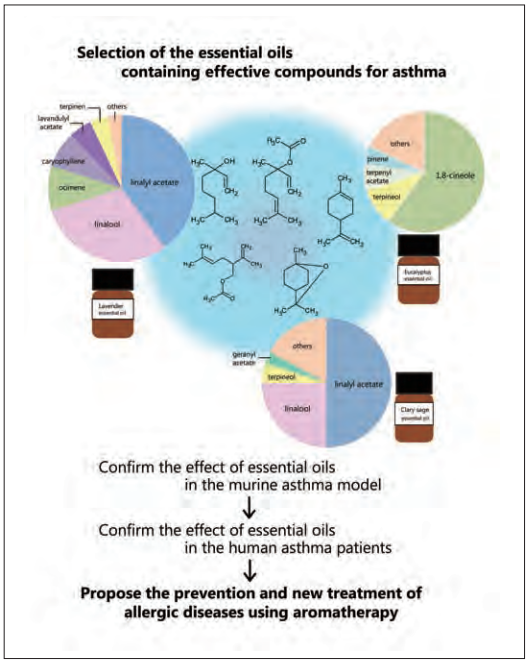
The number of patients (children and adults) with bronchial asthma in Japan is increasing and is currently estimated to be more than 8 million people. Studies have revealed that allergic airway inflammation is involved in the pathogenesis of asthma. Current treatments include inhaled steroids to reduce inflammation. However, since the etiology and pathogenesis of asthma are yet to be completely elucidated, the methods of prevention and main treatments are yet to be established. Thus, to reduce the symptoms and decrease the progression of asthma, I have focused on aromatherapy, which is easy to implement in daily life and which is classified as a complementary and alternative medicine. I also conducted research using essential oils extracted from plants.

In these studies, I have elucidated the anti-allergy effects of essential oils on airway hyperresponsiveness, mucus production, and eosinophil infiltration in a murine asthma model.



Applicability of research

An essential oil contains between 10 and 1000 organic compounds, and each of the approximately 300 different kinds of essential oils differs in its composition. In this study, I elucidated the anti-allergy effect of lavender essential oil in a murine model of asthma. I have also confirmed that the effects and functions differ depending on the type of essential oil, for example, in the aggravation of airway resistance due to one type of oil. Using a respiratory tract epithelial cell line, I will identify the essential oils that contain compounds with anti-inflammatory effects in asthma or those that exert effects on the airway remodeling, which is associated with chronic and intractable asthma. By scientifically elucidating the mechanism of action of essential oils, I aim to promote aromatherapy as a potential alternative medicine for allergic diseases.



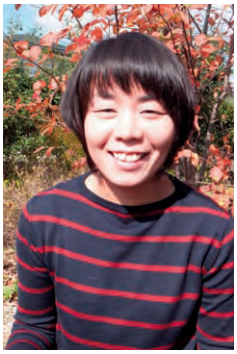
Short interview

Q. Please tell us about any personal difficulties you have experienced.

After I graduated from the university, I found a job, changed jobs, got married, and raised children. Of these experiences, raising my child changed my life significantly and forced me to reconsider my style of working. I had to often leave work early or remain absent because of illnesses during the first year after my first child began attending nursery school, and I was troubled when work did not go as planned and was unable to connect with my child due to the work pressure. I gradually learnt to pace myself by prioritizing my work within the limited available time.

Research topic

Immune regulating effects in humans of antigenic N-linked glycans expressed in plant glycoproteins



Megumi Maeda

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[Research field] Glycobiochemistry

Curriculum vitae

- April 2001 Biological Resources Graduate (MC), Okayama University, Graduate School of Natural Science and Technology, Department of Biological Resources
- April 2013 Biological and Molecular Science Graduate (DC), Okayama University Graduate School of Natural Science and Technology
- April 2006 Assistant Professor, Kawasaki Medical School Department of Hygiene
- April 2011 Assistant Professor, Okayama University Graduate School of Natural Science and Technology (adjunct)
- April 2012 Assistant Professor, Okayama University Graduate School of Environmental and Life Sciences (adjunct)
- April 2014 Assistant Professor, Okayama University Graduate School of Environmental and Life Sciences

【Academic degree】 Ph.D. (Agriculture), Okayama University, 2006

Keywords

N-glycans, glycopolymers, cell-mediated immune activity, dendritic cells, cytokines

Publications

① Maeda, M.*, Tanaka, T., Kimura, M., and Kimura, Y. Large-scale Preparation of Glycopeptides Harboring TF-antigen Unit from Royal Jelly. Biosci. Biotechnol. Biochem., 78, 276-278 (2013)

② Maeda, M., and Kimura, Y. Structural Features of Free *N*-glycans Occurring in Plants and Functional Features of de-*N*-glycosylation Enzymes, ENGase and PNGase. Front. Plnt. Sci. 5, 1-9 (2014)

③ Maeda, M.*, Akiyama, T., Yokouchi, D., Woo, K. K., and Kimura, Y. Purification and Molecular Characterization of Ginkgo Biloba β-Xylosidase Active for Plant Complex Type *N*-glycans. Biosci. Biotechnol. Biochem., 77, 1973-1976 (2013) (Referred)

④ Maeda, M.*, Takeda, N., Mano, A., Yamanishi, M., Kimura, M., and Kimura, Y. Large-scale Preparation of Asn-glycopeptide Carrying Structurally Homologous Antigenic *N*-glycan., Biosci. Biotechnol. Biochem., 77, 1269-1274 (2013) (Referred)

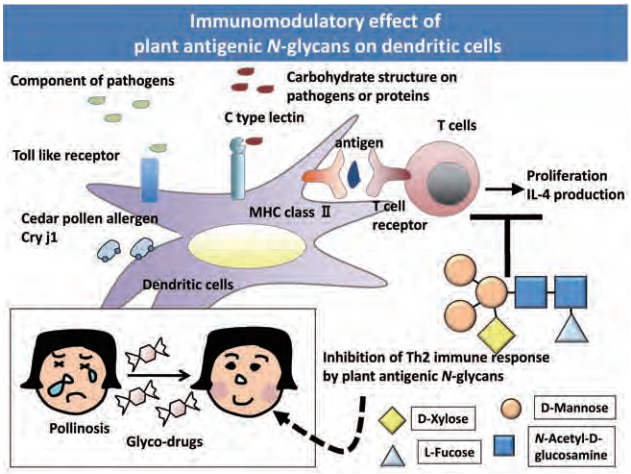
⑤ Yokouchi, D., Ono, N., Nakamura, K., Maeda, M., and Kimura, Y. Purification and characterization of β -xylosidase active for plant complex type *N*-glycans from tomato (Solanum lycopersicum): Removal of core α1-3 mannosyl residue is prerequisite for hydrolysis of β-2 xylosyl residue. Glycoconj. J., Doi 10.1007/s 10719-012-9441-y (2012) (Referred)

Short pitch

I am currently conducting research on plant antigenic *N*-glycans, which are attached to plant proteins, their physiological functions in plant cells, and their effect on the human immune system. When I was doctor course student, I purified an enzyme involved in the de-glycosylation of glycoproteins and analyzed the structural features of free *N*-glycans derived from glycoproteins by the enzyme. After receiving my doctorate, I have conducted research for 5 years how materials in the environment affect the human immune system. During my 3 years at WTT, I conducted research based on the knowledge and skills I had acquired. I recently have a collaborative research at the Ghent University in Belgium.

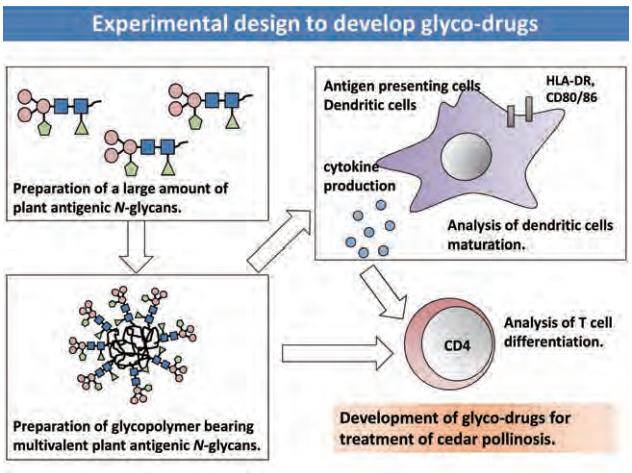
Research outline

Plant cell glycoproteins express plant antigenic asparagine-linked glycans (*N*-glycans) bearing α1,3-fucosyl and β 1,2-xylosyl residues on the tri-mannosyl core. *In vitro* experiments revealed that the core structure of plant antigenic *N*-glycan can be used to treat cedar pollinosis. In this study, I aimed to synthesize glycopolymers bearing multiple plant antigenic *N*-glycans that increase the immunological activity. Using the newly invented hydrophilic chromatography, I purified large amounts of asparagine-bound plant antigenic *N*-glycans (Asn-glycan) from seed storage proteins of *Ginkgo biloba*. Using γ-polyglutamic acid as the backbone of the polymer, I prepared glycopolymers bearing multivalently bonded Asn-glycans. Currently, I am investigating the immunological activities of the glycopolymers involved in differentiation of dendritic cells.



Applicability of research

I have succeeded in development of two methods for, a purification of large-scale Asn-glycan and a synthesis of glycopolymers. Now, I can generate glycopolymers bearing various structures of *N*-glycans for which the cellular immunological activity is still unclear. I have already purified and developed glycopolymers of animal complex type Asn-glycans from chicken egg yolk and high-mannose type Asn-glycans from *Vigna* beans. In addition, I have found that the glycoproteins of the water plant *Egerie densa* will be an excellent source of plant antigenic *N*-glycans bearing Lewis a apitope(s) at the non-reducing end.



Short interview

Q. Which experience have made you what you are today?

The things that have molded my personality are the things that I have eaten, the environment, and the people that I interact with. I am grateful for everything and would like to continue enjoying delicious food and interacting with important people.

Q. What is good for you as a faculty staff?

The most important aspect is the liberty and having the opportunity to determine the things that interest me. I am also able to meet researchers and students abroad, who I would never encounter in my regular life; these experiences enrich my heart and imagination.

Research topic

Will the appearance of forest ecosystems change with global environmental changes? –Evaluation based on breeding characteristics of trees–

Yuko Miyazaki

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[Research field] Forest ecology

Curriculum vitae

- March 2002 Completed major in Environmental Resource Sciences, Graduate School of Agriculture, Hokkaido University (MC)
- March 2003 Left Environmental Resource Sciences, Graduate School of Agriculture, Hokkaido University
- April 2003 Researcher, Forest Technology Center, Nara Prefecture
- April 2009 Postdoctoral fellow, Creative Research Institution, Hokkaido University
- November 2009 Visiting researcher, Institute of Plant Biology, University of Zurich
- January 2011 Postdoctoral fellow, Hokkaido University, Graduate School of Environmental Science
- April 2011 Assistant professor (adjunct), Okayama University, Graduate School of Environmental Science
- April 2012 Assistant professor (adjunct), Graduate School of Environmental and Life Science, Okayama University
- April 2014 Assistant professor, Graduate School of Environmental and Life Science, Okayama University

【Academic degree】Ph.D. (Environmental science), Hokkaido University, 2009

Keywords

plant responses to environmental conditions, field manipulation experiment, global environmental changes, plant reproduction, distribution model of species, tree climbing, transcriptome

Publications

① Miyazaki, Y., Mitsuhashi, H., Osawa, T.: Planning a management program for expanding bamboo forests based on scenario analysis. Japanese Journal of Conservation Ecology 20: 3-14 (2015) (in Japanese)

② Miyazaki, Y., Maruyama, Y., Chiba, Y., Kobayashi, M.J., Joseph, B., Shimizu, K.K., Mochida, K., Hiura, T., Kon, H., Satake, A.: Nitrogen as a key regulator of flowering in *Fagus crenata*: understanding the physiological mechanism of masting by gene expression analysis. Ecology Letters 17: 1299-1309 (2014).

③ Miyazaki, Y.: Dynamics of internal carbon resources during masting behavior in trees. Ecological Research 28: 143-150 (2013).

④ Miyazaki, Y., Ohnishi, N., Takafumi, H., Hiura, T.: Genets of dwarf bamboo do not die after one flowering event: evidence from genetic structure and flowering pattern. Journal of Plant Research 122: 523-528 (2009).

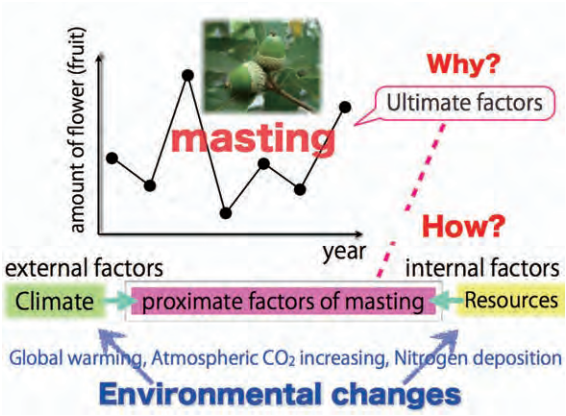
⑤ Miyazaki, Y., Hiura, T., Kato, E., Funada, R.: Allocation of resources to reproduction in *Styrax obassia* in a masting year. Annals of Botany 89: 767-772 (2002).

Short pitch

Forests occupy as much as one-third of the land area on Earth. The functions of forests are multifaceted, not limited to lumber production, but also include disaster prevention and biodiversity conservation. Forests support our livelihood. In recent years, environment surrounding forests has seen significant changes globally. Beginning with basic physiological responses of plants to environmental changes, I want to find out how plants leave the next generation, renew forests, maintain, and establish ecosystems. With the fieldwork as the foundation, I am working on these issues using chemical analysis such as analysis of sugar content, stable isotope analysis, tissue structure observation, and molecular biology experiments such as measurement of gene expression levels.

Research outline

Many trees composing forests change their flowering and fruiting amounts depending on the year: a phenomenon of rich and poor yield depending on a year, called masting. Proximate factors that lead to such a phenomenon include external factors such as temperature and precipitation, and internal factors such as nutrient contents in individual plants. However, the detailed mechanisms of such factors are not well understood. Therefore, (1) I examine changes in flowering and fruiting by controlling environmental conditions in field experiments, (2) capture gene expression changes occurring from flower bud formation to seed maturation under the same field experiment, and (3) aim to elucidate the factors that cause wide annual variations in yield. Furthermore, I evaluate how environmental changes such as warming and nitrogen deposition alter the flowering and fruiting patterns of trees, and how such changes impact ecological systems.



Applicability of research

1) By comparing flowering gene networks of non-model plants (trees) and model plants, I can provide materials to understand why a reproductive system with annual fluctuations in flowering and fruiting has occurred, and why there are diverse reproductive systems, evolutionary mechanisms, and survival strategies in plants.
2) By enabling response prediction of flowering and fruiting systems to the environment in the main tree species composing a forest ecosystem, I will be able to provide the foundation to evaluate ecosystem response to global environmental changes.

Short interview

Q. What made you choose your field and occupation?

When I was in high school, I became interested in the simultaneous flowering phenomenon (a phenomenon in which many species simultaneously flower/bear fruits once every several years), which takes place in the tropical rain forests of Southeast Asia. Thereafter, at university, I was smitten by the beauty of cool-temperature deciduous broad-leaved forests. I met my teacher there, and learned about the simultaneous flowering phenomenon in temperate forests where annual fluctuations of flowering and fruiting are observed in each species. That led to the beginning of my current research. I did hold different jobs for a while, but I could not resist the beauty of ecology, and ended up here.

Research topic

Genetic analysis of agricultural crop species using transposons and next-generation sequencing

Yuki Monden

[Affiliation] Graduate School of Environmental and Life Science (Agriculture)
[Position] Assistant Professor
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[Research field] Plant genetics and breeding

Curriculum vitae

◆Mar 2009 Graduate School of Agriculture, Kyoto University (Master Course)
◆Apr 2009 Japan Society for the Promotion of Science, Research Fellowship for Young Scientists (DC1)
◆Mar 2012 Graduate School of Agriculture, Kyoto University (Doctoral Course)
◆Apr 2012 Graduate School of Environmental and Life Science, Okayama University (Agriculture and Life Sciences), Assistant Professor (tenure track)
◆Apr 2015 Graduate School of Environmental and Life Science Okayama University (Agriculture and Life Sciences), Assistant Professor
【Academic degree】Ph.D. (Agriculture), Kyoto University, 2012

Keywords

Retrotransposon, crop species, protection of crop cultivars, next generation sequencing, DNA marker, ploidy, bioinformatics

Publications

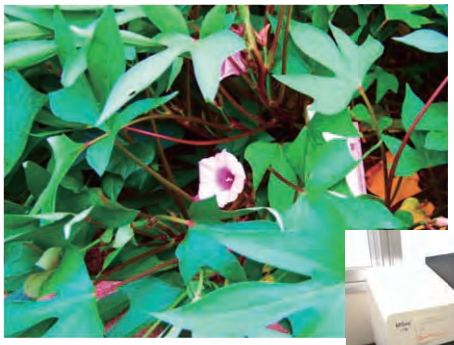
① Monden, Y., Hara, T., Okada, Y., Jahana, O., Kobayashi, A., Tabuchi, H., Onaga, S., Tahara M.: Construction of a linkage map based on retrotransposon insertion polymorphisms in sweet potato via high-throughput sequencing. Breeding Science, 65(2), 145-153 (2015).
② Monden, Y., Yamaguchi, K., Tahara M.: Application of iPBS in high-throughput sequencing for the development of retrotransposon-based molecular markers. Current Plant Biology, 1, 40-44 (2014).
③ Monden, Y., Fujii, N., Yamaguchi, K., Ikeo, K., Nakazawa, Y., Waki, T., Hirashima, K., Uchimura, Y., Tahara M.: Efficient screening of long terminal repeat retrotransposons that show high insertion polymorphism via high-throughput sequencing of the PBS site. Genome, 57(5), 245-252 (2014).
④ Monden, Y., Yamamoto, A., Shindo, A., Tahara M.: Efficient DNA fingerprinting based on the targeted sequencing of active retrotransposon insertion sites using a bench-top high-throughput sequencing platform. DNA Research, 21(5), 491-498 (2014).
⑤ Monden, Y., Takasaki, K., Futo, S., Niwa, K., Kawase, M., Akitake, H., Tahara M.: A rapid and enhanced DNA detection method for crop cultivar discrimination. Journal of Biotechnology, 185, 57-62 (2014).

Short pitch

I am involved in research and technological development aimed at cultivating and protecting cultivars of several crop species. In particular, I have used mobile genes called retrotransposons and next-generation sequencing (NGS) to conduct genetic analysis of hitherto under-researched species, such as *Ipomoea batatas*. My involvement is broad and ranges from farm-based fieldwork to laboratory-based DNA experiments and large-scale computerized genetic analysis. With your support, I aim to continue to actively pursue new research in collaboration with several other colleagues.

Research outline

Retrotransposons are transposable DNA sequences that exist within the genome of eukaryotic organisms. As many retrotransposon insertions are dispersed throughout the genome and are genetically inherited, differences in the insertion sites can be used to develop molecular markers for genetic analysis. In addition, next-generation sequencing is used to analyze and effectively identify a large number of insertion sites among crop cultivars. As a result, we are involved in various kinds of genetic analysis, including (1) the development of DNA markers for cultivar discrimination toward the protection of the crop cultivars; (2) the determination of genetic relationships among cultivars; and (3) the construction of linkage maps aimed at identifying agronomically important genes. We are conducting genetic analyses for several crop species such as *Ipomoea batatas*, strawberries, soybeans, wheat, apples, and shiitake mushrooms.



Genetic analysis using retrotransposons and next-generation-sequencing

Applicability of research

Findings from basic research, such as genome data and the results of genetic analyses, have been incorporated into applied research. An example of this is the development of practical techniques to discriminate of crop cultivars. This technique facilitates greater control over food fraud and enhanced protection of important Japanese premium cultivars. However, the necessary practical techniques have yet to be established. Thus, with the aim of developing techniques that can actually be used in the field, we have introduced a new method, the single-tag hybridization (STH) chromatographic printed array strip (PAS). Using this method, data can be obtained without experimental instruments or equipment, within a relatively short response time (15 minutes). We intend to strive toward further development aimed at the use of this method in locations such as customs offices and sites of food import and production.

Analysis Laboratory at Okayama University

Short interview

Q. What made you choose your field and occupation?

I hadn't thought initially about becoming involved in academic research. It was an older student and mentor from my days at Kyoto University who encouraged me in that direction by his example, he transmitted to me his vocal interest in science and his eagerness to engage in research. He is now engaged in research at a certain research institute, and I still try to emulate him.

Q. What is good for you as a faculty staff?

Most of all, I think it is the ability to conduct research as well as engage in stimulating communication with students. An additional advantage is the flexibility to engage in both basic and applied research, as well as the ability to occasionally venture sometimes into new fields. There are also some disadvantages, such as when my research does not progress as planned; however, some relaxation and a lively exchange of views with students and fellow researchers puts me back in the frame of mind to carry on with my research. I intend to continue learning and growing in my own way throughout life.

Research topic

Local regulation mechanisms of oviductal function in mammals

Yuki Yamamoto

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[Research field] Animal Reproductive Physiology

Curriculum vitae

- ◆Sept 2011 Doctorate of United Graduate School of Veterinary Sciences, Gifu University (DC)
- ◆Oct 2011 Tokyo University of Agriculture and Technology, Institute of Agriculture, (Animal Life Sciences), Special Research Fellow
- ◆Apr 2012 Graduate School of Environmental and Life Science, Okayama University, Division of Agriculture and Life Science, Tenure-track Assistant Professor
- ◆Apr 2015 Graduate School of Environmental and Life Science, Okayama University, Division of Agriculture and Life Science, Assistant Professor

【Academic degree】Ph.D. (Veterinary medicine), Gifu University, 2011

Keywords

Physiology, endocrinology, domestic animal reproduction, oviduct

Publications

① Yamamoto, Y., Kohka, M., Kobayashi, Y., Woclawek-Potocka, I., Okuda K.: Endothelin as a local regulating factor in the bovine oviduct. Reprod Fertil Dev, (2014), doi.org/10.1071/RD14076

② Yamamoto, Y, Kobayashi, Y., Okuda, K.: Purified culture systems in bovine oviductal stromal cells. J Reprod Dev 60: 73-77, (2014).

③ Kobayashi, Y., Wakamiya, K., Kohka, M., Yamamoto, Y., Okuda, K.: Summer heat stress affects prostaglandin synthesis in the bovine oviduct. Reproduction 146: 103-110, (2013).

Short pitch

Oviduct is the site for fertilization and early embryonic development in mammals (Figure 1). In addition, oviduct transports gametes to the site for fertilization and the early embryo to the uterus. They provide the optimal environment for the aforementioned functions. Functional abnormalities of oviduct can induce infertility. Although oviduct is an essential organ for establishment of pregnancy, no diagnostic or treatment methods of oviductal function have been developed in all mammals. The conception rate in cattle decreases consistently with each year, which is an urgent problem requiring an immediate solution. I study the regulating mechanism of oviductal function to contribute to the improvement of fertilization in mammals.

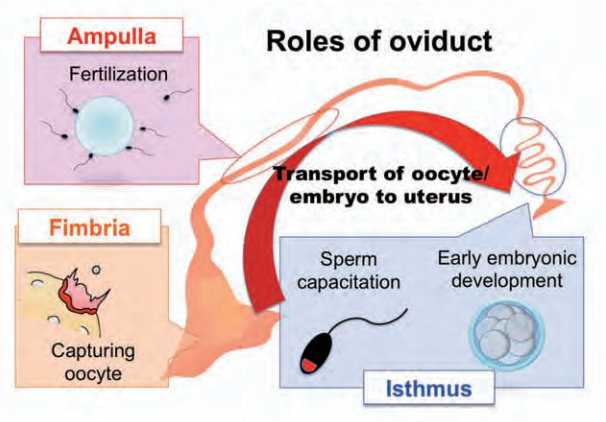


Figure 1.

Research outline

We study the physiology of oviductal cells in vitro using newly established cell culture systems of bovine oviduct (Figure 2).
Local mechanisms controlling the contraction and relaxation of the oviductal smooth muscle: The smooth muscle motility which is important for transport of gametes/embryo in the oviduct is controlled by several local factors. Therefore, we aim to clarify the regulatory mechanism of oviductal motility by studying the local factors that induce smooth muscle contraction and relaxation.
Factors providing the optimal environment in the oviduct: Optimal environment for fertilization and embryonic development is provided by oviductal secretion. We aim to find the local factors which directly or indirectly affect oocyte maturation, fertilization and embryonic development in the oviduct.

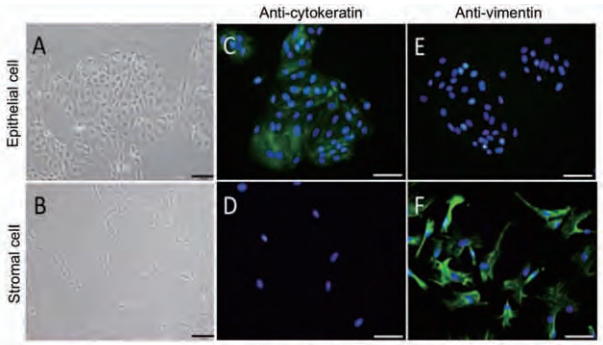
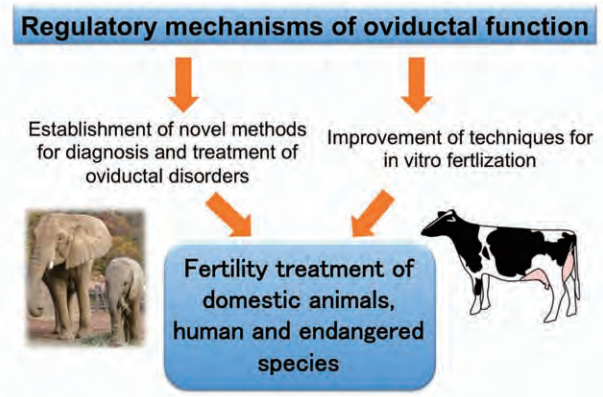


Figure 2. Cultured oviductal epithelial (A, C, E) and stromal (B, D, F) cells. Purity of each cell was confirmed using immunohistochemistry for cytokeratin (epithelial cell marker; C,D) and vimentin (stromal cell marker; E,F). Blue: nuclei, Green: cytokeratin or vimentin

Applicability of research

Abnormalities of the oviductal function lead to failure of fertilization, and poor development or death of the early embryo within the oviduct. In addition, abnormality in the transport of the early embryo in humans can cause to an ectopic pregnancy. If the control mechanism of oviductal function can be clarified, these new findings could contribute to the development of new diagnostic approaches targeting oviductal function and new fertility treatments. This knowledge could also contribute to the improvement of in vitro fertilization and embryo culture. We hope to develop our research to in vivo study to improve fertility treatments for domestic animals and humans in the future.



Short interview

Q. What made you choose your field and occupation?
My strong interest in animals set me on the path to become a veterinarian. Moreover, very attractive lectures of the animal physiology by my supervisor gave me a motivation to study my current specialization. My aim as a researcher is to contribute to clinical research by utilizing my aspect as a veterinarian.

Q. What is good for you as a faculty staff?
Faculty members are responsible for both research and education. Pursuing research with teaching students allows me to find my own disadvantages, and therefore that increases my motivation. In addition, science has no national borders. Collaboration with foreigner researchers and students, who have different cultures and speak different languages, is very exciting and valuable.

Research topic

“Material cycle-ecosystem interactions” driven by freshwater transport

Mitsuyo Saito

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[Research field] Hydrological science, biogeochemistry

Curriculum vitae

- March 2005 Graduate School of Biosphere Science, Hiroshima University (MC)
- April 2005 Research fellowship (DC1), Japan Society for the Promotion of Science
- March 2008 Graduate School of Biosphere Science, Hiroshima University (DC)
- April 2008 Researcher, Center for Marine Environmental Studies, Ehime University
- April 2011 Research fellow (PD), Japan Society for the Promotion of Science
- April 2013 Assistant professor (adjunct), Environmental Sciences, Graduate School of Environmental and Life Sciences, Okayama University

【Academic degree】Ph.D., Hiroshima University, 2008

Keywords

groundwater, freshwater-saltwater boundary, reservoir, basin, nutrient cycle, ecosystem effects, stable and radioactive isotopes

Publications

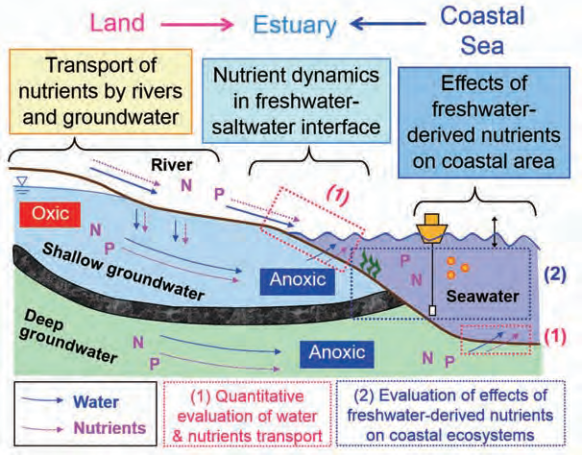
① Saito, M., and two others: Effects of residence time and nutrient load on eutrophic conditions and phytoplankton variations in agricultural reservoirs. IAHS Publication 361: 197-203 (2013).
② Saito, M., and eight others: Seasonal variation of the ^{222}Rn concentration in the central part of the Seto Inland Sea, Japan. Interdisciplinary Studies on Environmental Chemistry 6: 339-344 (2012).
③ Saito, M., and six others: Spatial variation of submarine groundwater discharge(SGD)in the central part of Seto Inland Sea. Interdisciplinary Studies on Environmental Chemistry 5: 117-123 (2011).
④ Saito, M., Onodera, S.: Is groundwater flow a controlling factor of denitrification process? — Current state and future challenges—. Journal of Japanese Association of Hydrological Sciences 41: 91-101 (2011).
⑤ Saito, M., and six others: Evaluation of nitrate attenuation potential in the groundwater of Jakarta metropolitan area, Indonesia. IAHS Publication 329: 305-310 (2009).
⑥ Onodera, S., Saito M., and eight others: Effects of intensive urbanization on the intrusion of shallow groundwater into deep groundwater: Examples from Bangkok and Jakarta. Science of the Total Environment 407: 3209-3217 (2009).

Short pitch

Japan is surrounded by ocean, and we receive many blessings from the sea such as food, resources, and energy. However, in recent years, the world’s coastal areas have experienced decreases in fisheries and aquatic resources. The reason for this may be the impacts of human activities on land, and environmental fluctuations. However, the details are unclear. Land and sea are connected through water circulation, and nutrients needed for living organisms such as nitrogen and phosphorus are transported to the sea through rivers and groundwater. I aim to elucidate the impact of such material transport through freshwater on ecosystems, and I am studying a wide range of fields from rivers, groundwater, lakes, and coastal areas.

Research outline

When considering material transport from land to sea, evaluation on the basin scale that contains land and sea is essential. However, estuaries and coastal areas that correspond to the boundaries between land and sea are the place where freshwater (river water and groundwater) and seawater flow and mix, forming a complex material circulation. Gaps between researchers of limnology and oceanography and lack of mutual understanding leave many points still unclear. Therefore, in this research, I aim to (1) conduct quantitative evaluation of nutrient transport through freshwater, including groundwater, and (2) elucidate their impacts on coastal lower-order ecosystems. I will analyze physical transportation of water on a basin scale that includes groundwater, river water, reservoirs, and coastal areas, and make evaluations based on multi-tracer analysis of stable and radioactive isotopes.



Applicability of research

In estuaries and coastal areas where freshwater and salt water come in contact, non-stationarity such as the impact of groundwater outflow, tidal fluctuations, and floods are not taken into consideration in quantitative evaluation of nutrient transport. Therefore, the results of this research will present new findings for existing concepts of material circulation in freshwater-salt water boundary areas. At the same time, my results are expected to be applicable to a wide range of areas such predicting fluctuations in nutrient circulation and biological production associated with climate changes and anthropogenic alteration to coastal areas (landfills and dikes, increased and decreased pollutant loads, etc.), to propose nutrient management policies that are appropriate for sustainable fisheries, and, furthermore, to predict fluctuations in river water and groundwater that are freshwater resources.

Seagrass meadow survey in the coastal area of Hinase, Bizen City, Okayama Prefecture.

Short interview

Q. What made you choose your field and occupation?

I did not plan to become a researcher (I did not even think I could become one). But when I was a senior in university, I became quite interested in my graduate thesis, and ended up here. I was always interested in water as a substance even as a child, but I think it was in high school when I started thinking about a job associated with water. I saw a female researcher analyzing water in a commercial, and vaguely thought that it would be great to do such work.

Q. What do you see yourself in the future?

I majored in limnology as a student, but as a researcher, I got a job in an oceanographic laboratory. There, I gained a perspective of observing the land from the sea, and gained connection to researchers in a wide range of fields. I hope to use this experience and to conduct research that connects limnology and oceanography in the future.

Research topic

A study on the function and localization of vesicular transmitter transporters

Miki Hiasa

[Affiliation] Graduate School of Medicine, Dentistry and Pharmaceutical Sciences (Medicine)

[Position] Assistant Professor

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[Research field] Biochemistry, Pharmacology, Physiological chemistry

Curriculum vitae

- March 2007 Graduate in Drug Discovery and Life Sciences (MC), Okayama University Graduate School of Medicine, Dentistry and Pharmaceutical Sciences
- April 2007 Research Fellow (DC1), Japan Society for the Promotion of Science
- March 2010 Graduate in Drug Discovery and Life Sciences (DC), Okayama University Graduate School of Medicine, Dentistry and Pharmaceutical Sciences
- April 2010 Research Fellow (PD), Japan Society for the Promotion of Science
- April 2011 Assistant Professor, Tokushima Bunri University, Faculty of Pharmaceutical Sciences, Laboratory of Biochemistry
- April 2012 Assistant Professor, Okayama University Graduate School of Medicine, Dentistry and Pharmaceutical Sciences, Department of Membrane Biochemsitry (adjunct)
- April 2015 Assistant Professor, Okayama University Graduate School of Medicine, Dentistry and Pharmaceutical Sciences, Department of Membrane Biochemistry

【Academic degree】Ph.D. (Pharmacy), Okayama University, 2010

Keywords

Transporters, biochemistry, vesicular transmitter transporters

Publications

① Hiasa, M., Miyaji, T., Haruna, Y., Takeuchi, T., Harada, Y., Moriyama, S., Yamamoto, A., Omote, H., Moriyama, Y.: Identification of a mammalian vesicular polyamine transporter. Scientific Reports, 4, 6836 (2014).

② Sakamoto, S., Miyaji, T., Hiasa, M., Ichikawa, R., Uematsu, A., Iwatsuki, K., Shibata, A., Uneyama, H., Takayanagi, R., Yamamoto, A., Omote, H., Nomura, M., Moriyama, Y.: Essential role of vesicular nucleotide transporter in ATP storage and secretion in neuroendocrine cells. Scientific Reports, 4, 6689 (2014).

③ Hiasa, M., Togawa, N., Miyaji, T., Omote, H., Yamamoto, A., Moriyama, Y.: Essential role of vesicular nucleotide transporter in vesicular storage and release of nucleotides in platelets. Physiological Reports, 2 (6), e12034 (2014).

④ Harada, Y., Hiasa, M.: Immunological identification of vesicular nucleotide transporter in intestinal L cells. Biological and Pharmaceutical Bulletin, 37 (7), 1090-1095 (2014).

⑤ Hiasa, M., Togawa, N., Moriyama, Y.: Vesicular nucleotide transport: a brief history and the vesicular nucleotide transporter as a target for drug development. Current Pharmaceutical Design, 20 (16), 2745-2749 (2014).

⑥ Hiasa, M., Isoda, Y., Kishimoto, Y., Saitoh, K., Kimura, Y., Kanai, M., Shibasaki, M., Hatakeyama, D., Kirino, Y., Kuzuhara, T.: Inhibition of monoamine oxidase A and stimulation of behavioural activities in mice by the inactive prodrug form of the anti-influenza agent oseltamivir. British Journal of Pharmacology, 169 (1), 115-129 (2013).

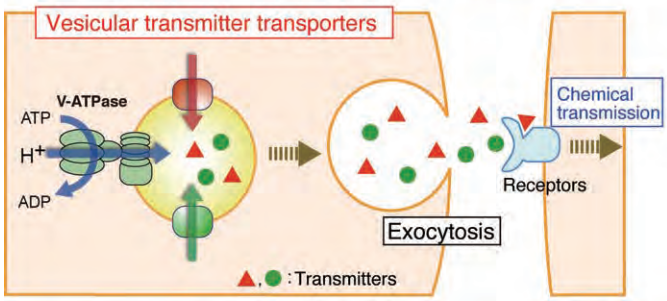
Short pitch

Since 2012, I am a WTT professor at the Okayama University and have been conducting research with the support of my mentors and students. During the daily research and interactions with fellow researchers, I have discovered my limitations and have also grown. I have moved on to be independent, but recently, I have had the opportunity to discover and research novel advancements owing to my associations with other members. Rather than isolating myself in my laboratory and focusing on my research, I would now appreciate exploring and deepening my interactions with people in various other fields.

Research outline

I am conducting research with a focus on transporters, in particular vesicular transmitter transporters, which exist on vesicles and function to transport transmitters into vesicles. Vesicular transmitter transporters are the key molecules that lead to chemical transmission. In addition to the transporters of glutamate, ATP, and other well-known transmitters, I am interested in novel transporters, such as those that transport polyamines and D-serine. I am also continuing my research with the aim of identifying cells and vesicles responsible for transmission mechanisms and aim to elucidate their regulatory mechanisms.

Vesicular transmitter transporters play a key role in chemical transmission



Applicability of research

Vesicular transmitter transporters are responsible for signal transmission and determine the type and strength of the transmissions. In these studies, I will identify novel transporters. By determining novel signal transmission mechanisms, it is possible to discover the physiological functions that they contribute to, as well as the pathogenic mechanisms resulting from their failure. Additionally, research on transport inhibitors, vesicular transmitter transporters, can aid in the development of novel drugs targeting vesicular transmitter transporters.

The subject of this research

Transmitters	Vesicular transmitter transporters	
D-serine	VDseT	201X
Polyamines	VPAT (SLC18B1)*	2014
ATP	VNUT (SLC17A9)	2008
Aspartate	VEAT (SLC17A5)	2008
Glutamate	VGLUT1-3 (SLC17A6-8)	2000
GABA・Glycine	VIAAT (SLC32A1)	1997
Acetylcholine	VAchT (SLC18A3)	1994
Monoamines	VMAT1, 2 (SLC18A1, 2)	1992

*: Hiasa *et al. Sci. Rep.*, 4, 6836 (2014)

Short interview

Q. What made you choose your field and occupation?

I first encountered transporters when I was a university student in the laboratory I was working in. My first research topic was to identify the role of a certain transporter. As transporters are interesting and have diverse functions and because of the beauty of the stained images of the tissue sections, I became engaged in my research. I still abide by my teacher's words: In order to make progress in transporter research, it is important to know the localization and substrates of the transporter.

Research topic

Regulation mechanisms for the expression of Si transporters in rice

Namiki Mitani-Ueno

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[Research field] Plant nutrition

Curriculum vitae

- Mar 2006 Graduate, Kagawa University Graduate School of Agriculture Department of Life Science (MC)
- Apr 2006 Japan Society for the Promotion of Science, Research Fellowship for Young Scientists (DC1)
- Sept 2008 Graduate, Graduate School of Natural Science and Technology, Okayama University, Bioscience Division (DC)
- Oct 2008 Japan Society for the Promotion of Science, Research Fellowship for Young Scientists (PD)
- Apr 2009 Institute of Plant Science and Resources, Okayama University, Assistant Professor on Special Contract
- Apr 2010 Institute of Plant Science and Resources, Okayama University, Assistant Professor (Specially Appointed)
- Oct 2013 Institute of Plant Science and Resources, Okayama University, Assistant Professor

【Academic degree】Ph.D. (Agriculture), Okayama University, 2008

Keywords

Plant nutrition, stress tolerance, silicon, regulation of expression

Publications

① Mitani-Ueno, N., Ogai, H., Yamaji, N. Ma, JF.: Physiological and molecular characterization of Si uptake in wild rice species. Physiol Plant. doi: 10.1111/ppl.12125. (2013).
② Yamaji, N., Chiba, Y., Mitani-Ueno, N., Ma JF.: Functional characterization of a silicon transporter gene implicated in silicon distribution in barley. Plant Physiol. 160, 1491-1497 (2012).
③ Montpetit, J., Vivancos, J., Mitani-Ueno, N., Yamaji, N., Remus-Borel, W., Belzile, F., Ma, JF., Belanger, RR.: Cloning, functional characterization and heterologous expression of TaLsi1, a wheat silicon transporter gene. Plant Mol Biol. 79, 35-46 (2012).
④ Mitani-Ueno, N., Yamaji, N., Zhao, FJ., Ma, JF.: The aromatic/arginine selectivity filter of NIP aquaporins plays a critical role in substrate selectivity for silicon, boron, and arsenic. J Exp Bot. 62, 4391-4298 (2011).
⑤ Mitani, N., Yamaji, N., Ago, Y., Iwasaki, K., Ma, JF.: Isolation and functional characterization of an influx silicon transporter in two pumpkin cultivars contrasting in silicon accumulation. Plant J. 66, 231-240 (2011).
⑥ Mitani, N., Chiba, Y., Yamaji, N., Ma, JF.: Identification and characterization of maize and barley Lsi2-like silicon efflux transporters reveals a distinct silicon uptake system from that in rice. Plant Cell, 21, 2133-2142 (2009).

Short pitch

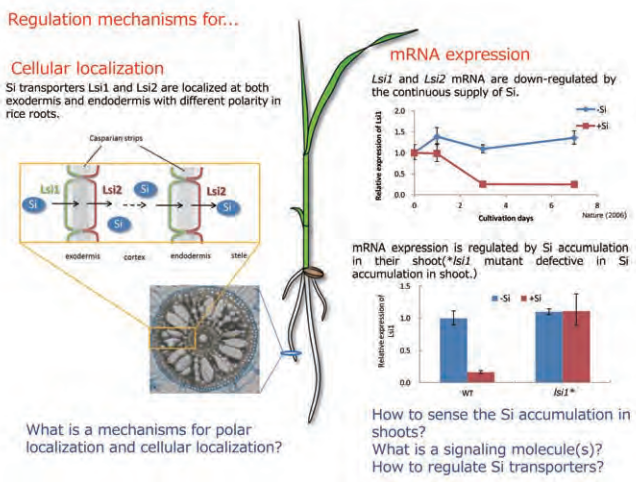
Plants are close to us, having been utilized as indispensable materials for food, clothing and housing since ancient times. Therefore, it is very important for us to have strong, healthy plants for cultivation. Silicon (Si) is a beneficial element for plant growth which can alleviate various stresses by accumulation in their shoots. However, Si content of the plants varies greatly with species and only those plants that are capable of accumulating the element can receive benefit from it. Rice is one of major Si accumulating plants. I am focusing on the study about molecular mechanisms of Si uptake and accumulation in rice for applying the beneficial effects of this element in many other plants.

Wild-type rice and a mutant with low silicon accumulation

The panicles of the mutant display discoloration and plant growth and yields are extremely poor

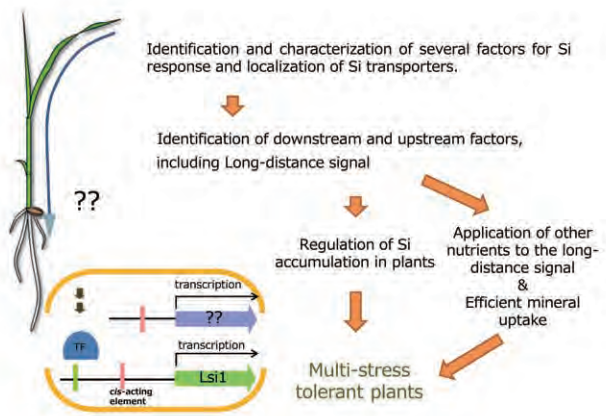
Research outline

Since the discovery of the silicon (Si) transporters, attempts to generate stress-tolerant plants by incorporating Si transporters have been made without any success. Actually, in many plants, functions of Si transporters are strictly regulated at many levels. For example, the expression levels of Si transporters in root are dependent on the level of Si accumulation in the shoots. Also, cellular localization of the transporters appear to be determined to maximize uptake of Si.
To understand multiple stress tolerance based on Si-involving mechanism, I believe that detailed information about regulation mechanism of expression and localization of Si transporters is necessary. Currently, I am focusing on research to elucidate regulation mechanism of Si transporter expression level and its polar localization in the tissue.



Applicability of research

Once we have clarified the mechanism of the regulation of Si transporters, and have identified the long distance signal(s) from shoot to root for Si uptake and accumulation, the information can be applied to develop plants with high tolerance to multiple stress. In addition, if the mechanisms for polar localization of the transporters are discovered, this knowledge can be applied to develop plants with efficient uptake of essential minerals from soil solutions. In the long term, these technologies will lead to an improvement in agricultural productivity and a reduction in the environmental burden.



Short interview

Q. What made you choose your field and occupation?
The idea that agriculture supports the food, which is the most basic and important for us, attracted me to agricultural laboratories dealing with crops. I remember that, at my early stage of my carrier, I was particularly motivated to be a researcher by the excitement of being able to discover totally unknown facts.

Q. Please tell us about any personal difficulties you have experienced.
I experienced difficulties during my two childbirths, and needed to be hospitalized for substantial period. It was difficult time for me, not being able to carry out any experiments and worried about delays with my research.

Research topic

Epigenetic regulation of gene expression in plants

Yoko Ikeda

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[Research field] Plant molecular genetics

Curriculum vitae

- Mar 2004 Graduate, Division of Biological Science, Graduate School of Science, Kyoto University (MC)
- Mar 2007 Graduate, Division of Biological Science, Graduate School of Science, Kyoto University (DC)
- Apr 2007 National Institute of Genetics, Postdoctoral Research Fellow
- Oct 2007 Nara Institute of Science and Technology, Graduate School of Biological Sciences, Postdoctoral Research Fellow
- Oct 2009 Nara Institute of Science and Technology, Graduate School of Biological Sciences, Global-COE Assistant Professor
- Nov 2011 Clermont Université, France, CNRS Postdoctoral Research Fellow
- Apr 2012 Japan Society for the Promotion of Science, Postdoctoral Fellowship for Research Abroad (Clermont Université, France)
- Dec 2013 Institute of Plant Science and Resources, Okayama University, Assistant Professor (specially appointed)

【Academic degree】Ph.D. (Science), Kyoto University, 2007

Keywords

Epigenetics, DNA methylation, histone modification, transposable element, environmental response, plant hormone, genomic imprinting

Publications

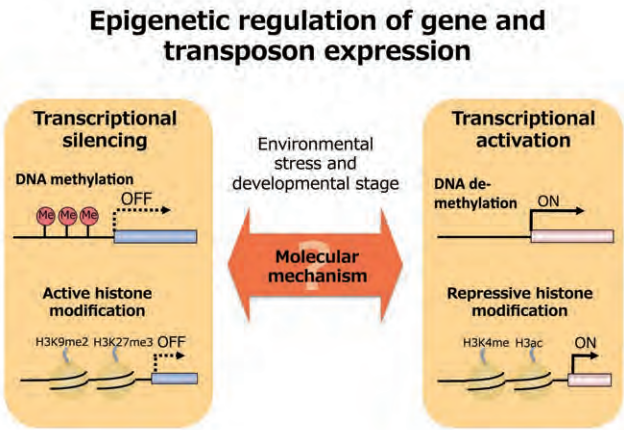
① Ikeda, Y.: Plant imprinted genes identified by genome-wide approaches and their regulatory mechanisms. Plant and Cell Physiology, 53(3), 809-816, (2012).
② Ikeda, Y., Kinoshita, Y., Susaki, D., Ikeda, Y., Iwano, M., Takayama, S., Higashiyama, T., Kakutani, T., Kinoshita, T.: HMG domain containing SSRP1 is required for DNA demethylation and genomic imprinting in Arabidopsis. Developmental Cell, 21(3), 589-596, (2011).
③ Ikeda, Y. and Kinoshita, T.: DNA demethylation: a lesson from the garden. Chromosoma, 118(1), 37-41, (2009).
④ Tiwari, S., Schulz, R., Ikeda, Y., Dytham, L., Bravo, J., Mathers, L., Spielman, M., Guzman, P., Oakey, JR., Kinoshita, T., Scott, JR.,: MATERNALLY EXPRESSED PAB C-TERMINAL, a Novel Imprinted Gene in Arabidopsis, Encodes the Conserved C-Terminal Domain of Polyadenylate Binding Protein. The Plant Cell, 20(9), 2387-2398, (2008).
⑤ Ikeda, Y., Kobayashi, Y., Yamaguchi, A., Abe, M., Araki, T.: Molecular basis of late-flowering phenotype caused by dominant epi-alleles of the FWA locus in *Arabidopsis*. Plant and Cell Physiology, 48(2), 205-220, (2007).

Short pitch

Owing to my fascination with the mechanisms of epigenetic gene regulation, I have been involved in basic research using plants for over a decade. I have been carrying out analysis relating to DNA methylation/demethylation and histone modification using mutants of the model plant *Arabidopsis thaliana*, and I am currently embarking on analyses using several other plant species as well. Presently, I am particularly interested in the ways in which epigenetic information is affected by changes in the environment. Looking ahead, I would like to determine the epigenetic molecular mechanisms of epigenetic control in various vital phenomena.

Research outline

Genes responsible for vital genetic information are coded in DNA base sequences; however, epigenetic information outside the DNA sequence has been found to play an important role in gene expression and function. Such epigenetic information including DNA methylation and histone modification is known to be affected depending on the stage of growth and changes in the environment. I have been carrying out research based on molecular genetics into i) the type of molecular mechanism that controls DNA methylation and histone modification in plants; ii) the manner in which the expression of genes and transposable elements is regulated; and iii) the ways in which epigenetic information is transmitted to the next generation.



Applicability of research

Research into mechanisms of epigenetic gene expression, such as DNA methylation and histone modification, has enabled to design gene expression and scientists are now able to enhance the expression of useful genes and inhibit the expression of harmful genes. It may be possible to apply DNA methylation changes in breeding. In addition, DNA methylation and histone modification are also involved in the regulation of transposons in the genome, and it is possible that the technologies will be used with these elements to achieve a variety of improvements in the future. We are now aware that the processes of epigenetic change in accordance with environmental stress, and it is reasonable to expect that research into these mechanisms will lead to methods to increase stress tolerance. Currently, in addition to *Arabidopsis thaliana*, analyses are also being conducted on other plants such as wheat, rice, moss, and seaweed.

Left: *Arabidopsis thaliana*; Top right: Rice;
Bottom right: *Marchantia polymorpha*

Short interview

Q. Which experiences have made you what you are today?

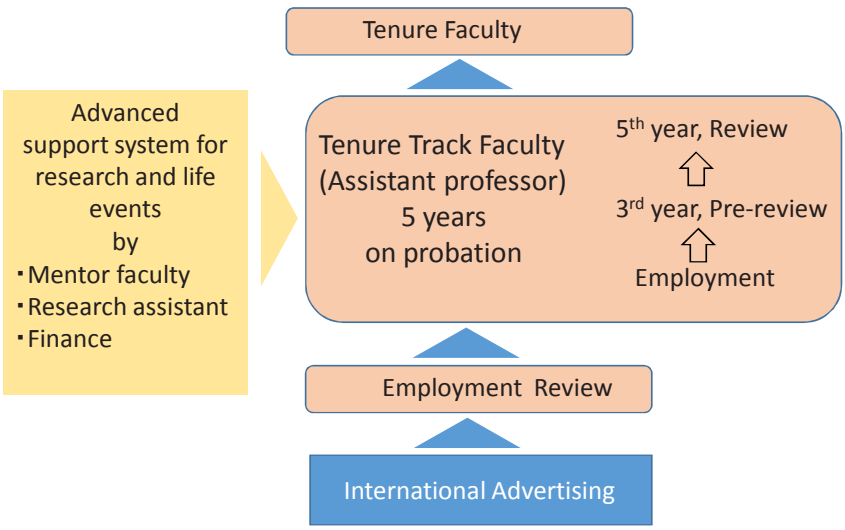
I think that it is probably my strong interest in, and enthusiasm for, the subjects of my research that have motivated me to continue in research. I have many weaknesses, but I think that one of my strengths is persistence. In addition, I am grateful to the people that I have been lucky enough to have around me to support me, including my family; friends; my former teachers, who taught me the joys of research; and the colleagues I have encountered.

Q. Please tell us about any personal difficulties you have experienced.

I lived apart from my husband for six years. Last two years, we were separated by the long distance between Japan and France; however, we have recently begun to live together for the first time in a while. At the moment, we are working hard to synchronize our lifestyles.

What is the Woman Tenure-Track (WTT) system?

Okayama University is committed to achieving excellence in research that meets global standards and becoming recognized as the world headquarters of research and intellectual communication. One of the systems that has been introduced to reach that goal in 2009 is the “Woman Tenure Track (WTT)” system. The system was established to promote hiring and professional development of quality woman faculty at Okayama University. The WTT faculty system concerns strategic human resource management involving granting permanent contracts to women faculty who gained certain levels of experience in conducting independent research and meet the tenure standards established at their departments. Permanent contracts constitute either no time-limited employment or on contract employment with the unlimited renewal privilege* (*Some restrictions may apply). In addition to providing a mentor to each newly hired WTT faculty, the WTT system allows the WTT faculty members to appoint a research assistant as needed. By creating a support system that takes various life events of tenure-track woman faculty into consideration, Okayama University strives to create a friendly work environment for all women faculty members where they can reach their maximum potential in research and teaching without any disadvantage to their men counterparts.



The WTT faculty members as mothers

Dr. Eguchi, Assistant Professor

"We are now taking a walk in the park. She will be running around outside very soon. Kids do grow very quickly."

Dr. Miyazaki, Assistant Professor

"After receiving tenure, I took advantage of the maternity leave entitlement and spent one year in Malaysia where my husband conducts research."

Dr. Honda, Assistant Professor

"During my WTT years I took my maternity leave. I am now trying to raise a child for the first time."

Dr. Mitani, Assistant Professor

"I am striving to raise my children with the help of people around me. I want to grow together with my children."

Note: Please be aware that there is no profile in this Seeds Collection for Phase III WTT Assistant Professor Honda in the Graduate School of Environmental and Life Science (Environment), as she is currently on maternity leave.

~Our University has the system to support Moms and Dads who are raising children~

The Research Assistant System

The system helps to create a conducive research environment for everyone by providing research assistants to our full-time and part-time faculty members who are faced with the time management challenge due to family responsibilities such as child birth and rearing or caring for older people.

The Women's Information Support Center

The Women's Information Support Center provides information about child rearing and work as well as counseling

The Nakayoshi Day Care Center

Location: Shikada campus
Eligibility: Children from 6 months old to less than 5 years old
Admission capacity: Maximum of 90 children
Days: Monday to Friday
Hours: 7:30 am to 6:00 pm with 20 minute maximum extension of nursing time)
※non-registered childcare

The Mascat Sick Child Day Care Center

Location: Shikada campus (Located within the Okayama University hospital)
Eligibility: Children from 6 months old to 6th grade
Admission capacity: 5 children (Advanced registration required)
Days: Monday to Friday
Hours: 8 am to 5:30 pm

The Kainoki Kids Club

Location: Tsushima Campus
Eligibility: 1st graders to 6th graders
Admission capacity: 60 children
Days: During school breaks (spring, summer, winter)
Hours: 8:30 am to 7:00 pm

Afterword

As you have read, for this year's WTT Teachers' Edition we prepared a collection of Seeds profiles of Okayama University's female researchers. I would like to thank all of the teachers who provided their Seeds profiles. We were able to complete this publication following discussions with the Organization for Research Promotion & Collaboration and the URA. I would like to thank them for their assistance.

What we are aiming for with this publication is to provide a collection of research Seeds profiles that female researchers will pick up and read. At the same time as including the wonderful research seeds of our up-and-coming WTT teachers, we have also arranged the columns so that the readers can get to know them as people. The design also makes use of many soft lines, and we think it is something a bit different from the usual. If I may speak boldly without the fear of being misunderstood, our aim was to slightly surprise those who are accustomed to reading booklets introducing technologies. There is a new market for more innovative booklets, and our intention is for Okayama University to make inroads into it.

The University is supporting many female students who are conducting research from extremely interesting viewpoints. On the other hand, it is also true that there have been instances of female students not fully utilizing their expertise due to various circumstances in their lives. To enable people with alternative viewpoints to develop a new market, we would be delighted if this booklet assists to some degree in building a new university and research environment. At the same time, we would be happy if it helps to widen the reader's view and contributes to their understanding of this research. For the people we connect with in this way, we hope that we create a "connection" in a form that is different from the link normally envisaged.

Finally, I would like to thank everyone in the Office for Promotion of Gender Equality who contributed to the editing work, and look forward to their future assistance in developing the second and third editions.

Graduate School of Environment
and Life Science (Environment)
Yasushi Mori

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