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■ News

First deposit from Japan: Barley seeds are preserved in Svalbard Global Seed Vault

Professor Kazuhiro Sato of Okayama University's Institute of Plant Science and Resources (IPSR) visited the "Svalbard Global Seed Vault" (Spitsbergen island, Svalbard islands, Norway) on 25 February 2014 and deposited 575 strains of barley seed samples (300 grains each) brought from IPSR. The Vault is the world's largest facility for the storage and preservation of plant seeds from all around the world. The IPSR barley seeds are important genetic resources as the bases for crop improvements for food security of human beings, and by storing them in the Vault, their long-term safety will be guaranteed.

The barley seeds included many lost strains for cultivation, and were collected from several locations around the world for about 70 years and kept at IPSR. Currently, they are distributed to domestic and foreign scientists as part of the National BioResource Project supported by the Ministry of Education, Culture, Sports, Science and Technology. East Asian areas, especially Japan, Korean Peninsula, China and Nepal, are regions of high barley genetic diversity and IPSR has become the center of preservation and distribution of barley seeds from these areas, which are considered as being one of the top five precious genetic resources in the world.

The plant seeds taken by Professor Sato from the IPSR were the first ones ever to be deposited in the Vault Japan. To commemorate the event, the seeds were deposited in the presence of Marie Haga, the Executive Director of Global Crop Diversity Trust (established by Food and Agriculture Organization of the United Nations and Consultative Group on



Entrance of Svalbard Global Seed Vault



Staff carrying the barley seeds to the Vault



Professor Sato (right) depositing the barley seeds.

International Agricultural Research) which manages the Vault.

Currently, about 800,000 different kinds of seeds are preserved in the Vault, with the barley seeds being preserved at minus 18 degree Celsius. The IPSR is planning to deposit 5,000 strains of barley. The genetic diversity of all these strains is used to carry out basic research to overcome unfavorable environments and to develop new cultivars for the future.



The barley seeds deposited by the Institute of Plant Science and Resources

■ News

Okayama University Staff Join the Sports Day in Cambodia

On December 7, the Wat Chork Primary School in Siem Reap, Cambodia held their first ever physical education festival, under the auspices of the Cambodian Ministry of Education, Youth and Sport, other government bodies. Sixteen volunteers from Japan also took part in the physical education festival, including Yuichi Hara, lecturer at the Graduate School of Education of Okayama University, members from the Okayama Prefecture and City Boards of Education, and students from Okayama University.

Approximately 1200 children from the elementary school were joined by their parents and guardians in participating in the events of the physical education festival. In addition to well known events, such as relay races and ball games, the festival was also an opportunity to highlight the results achieved by everyday physical education at the school. This led to events based on the Cambodian curriculum also being built into the program, such as soccer goal scoring and basketball point scoring competitions, and the resulting physical education festival was uniquely Cambodian. The children really enjoyed their first experience of participating in this kind of event, throwing themselves passionately into each competition and shouting loud encouragement to their teammates, and overall displaying levels of excitement far beyond those seen at comparable events in Japan.

Regarding the planning of the event, Okayama University collaborated with the NPO Hearts of Gold (Okayama City, Representative Director Yuko Arimori). When Hearts of Gold received teachers



Yuichi Hara at a meeting in Cambodia.



Yuichi Hara (left) reports on the results of the festival to the Vice Minister of the Ministry of Education, Youth and Sport.



Score boards made by the students under the motto "Japan Quality"

from Cambodia last year, members of the Cambodian Ministry of Education, Youth and Sport saw physical education lessons in affiliated schools and city physical education festivals for the first time, and requested support in holding the same kind of event in Cambodia. Yuichi Hara used means such as internet video conferencing to hold meetings and make preparations to hold the event this September. Students from Okayama University came into contact with the smiles and energy of the Cambodian children, and learnt a great deal through this interaction with people who have very different values from their own.

Taking the lessons learned from the Wat Chork Primary School physical education festival onboard, Yuichi Hara and his colleagues are now working with members of the Ministry of Education, Youth and Sport to create a manual for holding Cambodia's own original physical education festivals. Word of their success has already been reported to the Vice Minister of the Ministry of Education, Youth and Sport and the Japanese Embassy, who offered strong encouragement for providing continued support in the future.



Tug of war between organizers and students

■ News

African Educators Begin Course at Okayama University

Educators from Africa, including elementary school teachers, began a two month course in elementary mathematics and science education on 14 January 2014. The course is being taught by instructors from Okayama University.

Although school attendance rates have improved in Africa there are still issues related to raising the quality of education. Thus in response to demands for improving education standards in Africa, this course was devised as one part of the Region-Focused Training Program of the Japan International Cooperation Agency (JICA). The course participants will revise lesson plans that they made prior to their arrival in Japan through classes at the university, and at the end of the course will teach pupils at Okayama Municipal Ishima Elementary School.

In addition to the course participants, the opening ceremony held at the Faculty of Education Hall was also attended by Dr. Masaru Araki, Director of the International Center; Dr. Masaru Kaga, Dean of the Graduate School of Education; and Takeo Ishikawa, Head of the Chugoku JICA Training Program Section. In his speech Dr. Araki said that, "elementary school education plays an extremely vital role as the foundation of all subsequent education, and we hope that the course will be of use to the future of the children and nations of Africa."



■ News

Okayama University receives the "Business Matching Award" at "nano tech 2014"

Okayama University received the "Business Matching Award" at the 13th International Nanotechnology Exhibition & Conference" held at Tokyo Big Sight, 29-31 January 2014 — the world's biggest exhibition on nanotechnology as known as "nano tech 2014". This category award of the "nano tech 2014 Grand Award" is given to the organization that makes the largest number of appointments with exhibitors and visitors at the exhibition.

The award acknowledges the excellence of the presentations given by Okayama University. The Okayama University poster and oral exhibitions focused on four technologies including "preparation and functionalization of graphene oxide" for applications such as telecommunication, electronics, environment and energy, presented by Associate Professor Yuta Nishina at the Research Core for Interdisciplinary Sciences; and "long and high density aligned carbon nanotubes for dry processing" as an alternatives to conventional powder and liquid states toward bulk scale use such as high-strength and high-conductivity electric wires and sheets, by Professor Yasuhiko Hayashi at the Graduate School of Natural Science and Technology.

The members of Okayama University actively interacted with many visitors and exhibitors from other organizations by utilizing the "Business Matching System" which builds between the seeds and needs through the Internet, and thereby made the largest number of business appointments with them. As a result, the nano tech 2014 executive committee



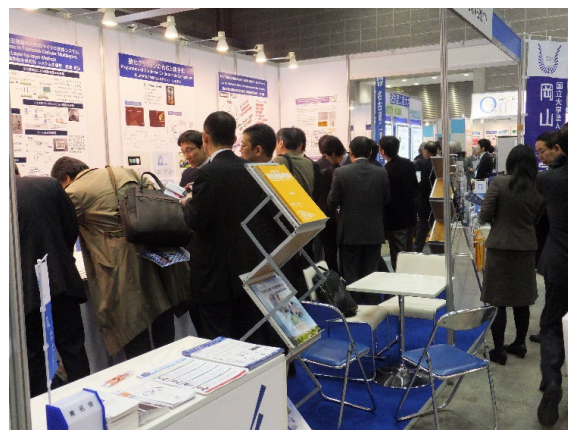
Okayama University being presented the "Business Matching Award".



Researchers from Okayama University and individuals from business sectors carrying out business matching.

gave the "Business Matching Award" to Okayama University for their intensive commitment to Open Innovation.

Organization for Research Promotion & Collaboration will actively support participation in exhibitions to promote and popularize Okayama University's research achievements and technological transfers.



Participants gathering around the exhibition booth of Okayama University.



Associate Professor Nishina making an oral presentation at the Seeds & Needs seminar.

■ Feature

Pendulum power: Innovative pendulum-dynamo for converting tidal energy into electrical power

Okayama University's Shinji Hiejima is looking for industrial partners to commercialize his experimentally proven and patented concept of the Hydro-VENUS system for converting tidal energy into electrical power.

Research on converting tidal energy into electricity energy has a long history with the European Marine Energy Centre, in Scotland being one of the major international hubs for testing ideas on extracting energy from the motion of seas and tidal currents. In Japan the search for energy resources is a high priority with research on exploiting the power of the seas surrounding the Japanese archipelago being actively pursued. Notably, a report published by New Energy and Industrial Technology Development Organization (NEDO) in 2010 states that the potential of tidal energy in Japan is equivalent to 20 nuclear power plants. Furthermore, the Seto Inland Sea—where Okayama University is located—has been assessed as being a site with especially high potential.

"I want to exploit the mechanical motion of a pendulum to generate electricity from tidal currents," says Shinji Hiejima, an associate professor at the Graduate School of Environmental and Life Science of Okayama University. Hiejima was born in Iwakuni City, Yamaguchi Prefecture, famous for its Kintaikyo Bridge.



Shinji Hiejima, associate professor, Graduate School of Environmental and Life Science, Okayama University.

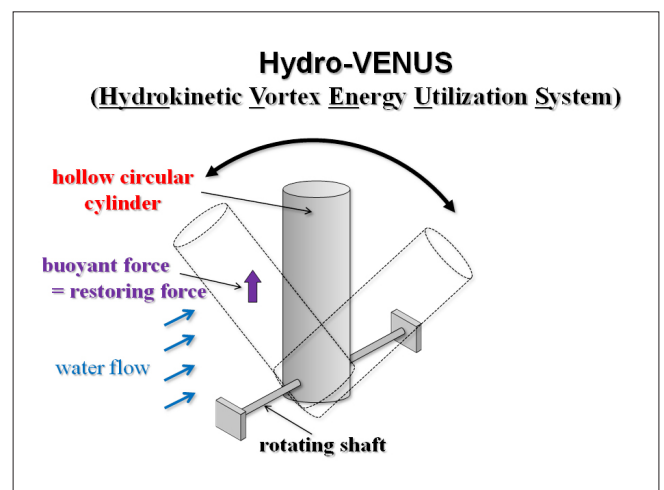


Fig.1: Hydrokinetic Vortex Energy Utilization System or Hydro-VENUS. The arrow which indicates vibration direction.

"My fascination with the structure of bridges triggered my research on the interaction of strong winds with massive bridges such as the Seto Bridge that connects Okayama with Kagawa in Shikoku," says Hiejima. "In my early research I analyzed why large bridges oscillate when hit by strong winds such as typhoons. Now, I am focusing on harnessing tidal energy as a stable source of electricity. I am looking for partners to develop my ideas on the Hydrokinetic Vortex Energy Utilization System or Hydro-VENUS—a large underwater pendulum based system."

Hiejima points out that propeller type turbine systems being tested in Europe has three major drawbacks: High strength required for the materials used for making the rotor blades leads to increases in cost; waste in the ocean clogs up and damages rotors; and, fisherman consider the sharp edges of rotor blades to be harmful to marine life.

To resolve these limitations of propeller based tidal energy conversion, Hiejima began by analyzing the potential of power generated by flow induced vibrations of cylinders placed horizontally in water. This approach overcomes aforementioned shortcomings of propeller but the vortex induced vibrations — the cylinder moves translationally as waves moves across them — in these systems typically only yields a power efficiency of approximately 37% of

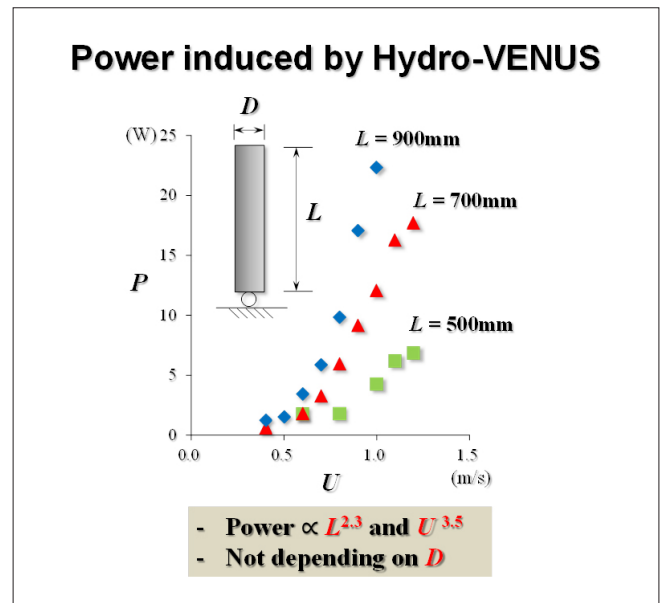


Fig.2: Power induced by Hydro-VENUS in terms of the dimensions of the open cylinder.

so-called VIVACE converter obtained in the experiments of a group in the USA.

"The translational motion of cylinders (such as used in VIVACE) limits the efficiency of tidal flow induced vibrations of cylinders," says Hiejima. "My concept for the Hydro-VENUS shown in Fig.1 does not vibrate translationally but rotationally, and initial tests yielded a power efficiency of 76% as shown in Fig.2." Early tests were carried out using 1.5 m cylinders as shown in Fig. 3. Hiejima is now developing 20 m cylinders from a wide range of materials with the goal of producing highly efficient structures.

"I have patented and demonstrated the potential for my version of a pendulum-dynamo," says Hiejima. "I am looking for industrial partners to commercialize it."

Further information

Patent : Japanese patent : PCT/JP2012/004000 (Dynamo)

Website : <http://www.cc.okayama-u.ac.jp/~hiejima/>

Contact : hiejima@okayama-u.ac.jp



Fig.3: Offshore towing experiments

Research Highlights

Plant science: Plant models for crop breeding of the future

Minichromosomes have been extensively used as tools for revealing the functional structures of eukaryotic chromosomes. In the most popular model plant, *Arabidopsis thaliana*, however, only six different minichromosomes have been found or created to date, due to their extremely small sizes that limit detection by optical microscopy.

This review article summarizes the structure and stability of all the minichromosomes that Minoru Murata and colleagues at Okayama University have isolated since 2006, and describes their interesting features.

Minichromosomes vary from 1.7 Mb to 8.4 Mb in length and are much shorter than authentic chromosomes (25.3 Mb to 38.0 Mb). Linear and circular minichromosomes have been identified, and both types are maintained as experimental lines (Fig. 1). Intriguingly, most of the circular, ring-shaped minichromosomes in *Arabidopsis* are relatively stable at mitosis and transmissible to the next generation, regardless of the centromere form (dicentric or monocentric).

Recently, a ring minichromosome was artificially generated by a combination of the DNA sequence-specific recombination system, Cre/LoxP, and the DNA transposon system, Activator/Dissociation (Fig. 2, Murata et al. 2013). This artificial ring chromosome, AtARCl, has several advantages over the previously reported minichromosomes as a chromosome vector. Hence, Murata has proposed applying this method of generating plant artificial chromosomes to important crops for breed improvement in future.

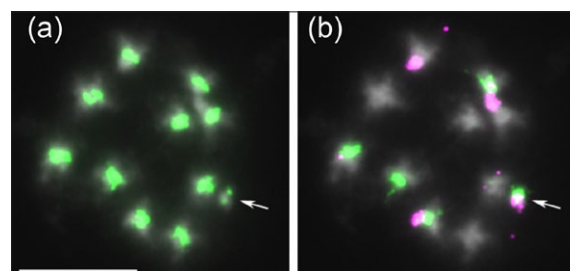


Figure 1. FISH images of a mitotic prometaphase cell from a Tr4S plant carrying a minichromosome, mini4S. (a) The 180 bp repeats in green. (b) The 5SrDNA in red and the 18S rDNA in green. Arrows are mini4S. Scale bar=5 μm

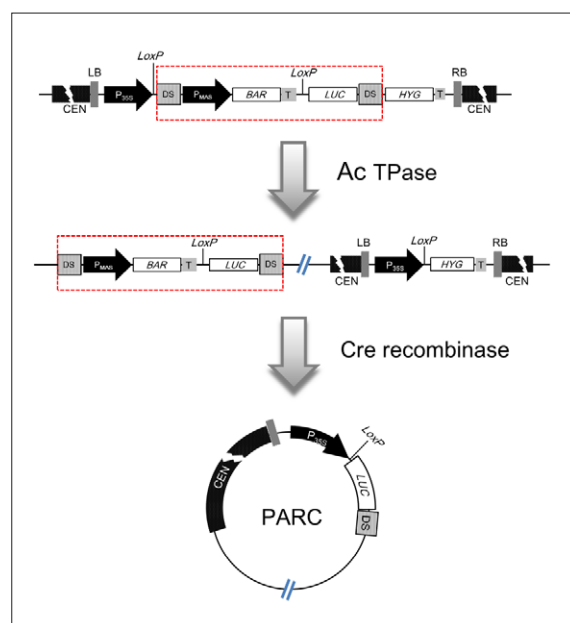


Figure 2. An outline of the method for generating plant artificial ring chromosomes.

Reference:

- Author: Minoru Murata
- Title of original paper: Minichromosomes and artificial chromosomes in Arabidopsis
- Journal, volume, pages and year: Chromosome Res, On-line first, May2, 2014.
- Digital Object Identifier (DOI): 10.1007/s10577-014-9421-0
- Affiliation: Institute of Plant Science and Resources, Okayama University

Research Highlights

Photosynthesis: New model of the quality control of Photosystem II

Thylakoid membranes are piled up to form the grana well known as the site where the Photosystem II (PSII) complexes which play a role in the primary photochemical reaction exist. However, the structures and dynamics of thylakoid membranes are still unclear. In higher plants, the D1 protein binding to the reaction center of PSII is easily damaged by strong light, which leads the decrease of photosynthetic efficiency. The damaged D1 protein is removed immediately by FtsH proteases located near the PSII, and the newly synthesized D1 protein is inserted in the D1-depleted PSII complex. This maintenance system keeps photosynthetic activity under light stress.

Now, it has been revealed that the molecular process of quality control of PSII described above has a close relationship with the structural changes of thylakoid membranes. M. Y.-Nishimura and Y. Yamamoto at Okayama University proposed the new model of the quality control of PSII focused on the structure of thylakoid membranes.

Under normal conditions, FtsH proteases do not migrate easily on the thylakoid membranes because of the narrow space of the partition gap of grana. When thylakoid membranes are subjected to excessive light, the stacks of thylakoid membranes were found to be unstacked. This structural change of the thylakoid membranes is helpful for the migration of the FtsH proteases to access the damaged D1 protein. In the future, more investigations about the structure of thylakoid membranes will be needed for the complete understanding of the dynamics in the quality control of PSII.

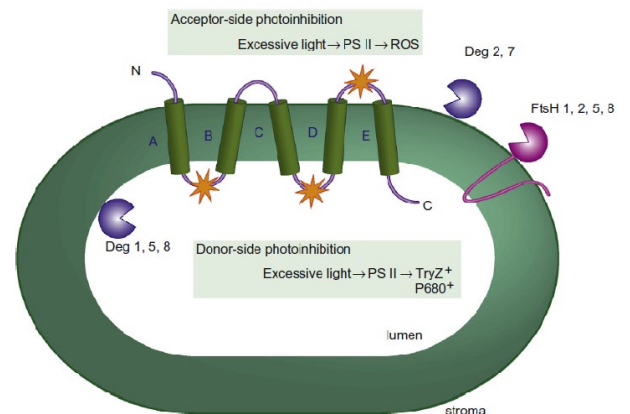


Figure caption: Degradation of the D1 protein by proteases.

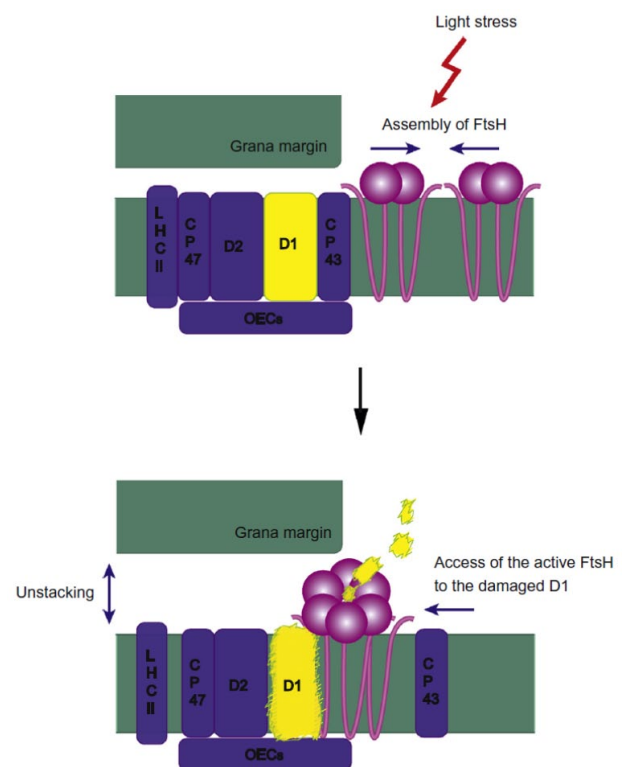


Figure caption: Unstacking of the thylakoid membranes.

Reference:

- Authors: Miho Yoshioka-Nishimura, Yasusi Yamamoto.
- Title of original paper: Quality control of Photosystem II: The molecular basis for the action of FtsH protease and the dynamics of the thylakoid membranes.
- Journal, volume, pages and year: *Journal of Photochemistry and Photobiology B: Biology* , in press (2014).
<http://ousar.lib.okayama-u.ac.jp/metadata/52503>
- Digital Object Identifier DOI: 10.1016/j.jphotobiol.2014.02.012
- Journal website: <http://www.sciencedirect.com/science/article/pii/S1011134414000499>
- Affiliations: Graduate School of Natural Science and Technology, Okayama University.
- Department website: http://www.biol.okayama-u.ac.jp/index_e.html

■ Research Highlights

Repairing DNA lesion

Repair of DNA lesion is essential for mammalian development. Notably, DNA lesions in cells caused by genotoxic agents results in arrest of cell cycle and ultimately in cell death. In response, DNA polymerase ζ (Pol ζ) is a translesion DNA polymerases that repair DNA damage and relieve cell cycle arrest.

However, the role of translesion DNA synthesis in mammalian development is remains unclear.

Now, Tetsuo Kunieda and colleagues at Okayama University report that Pol ζ plays an essential role in mammalian development by using a mutant mouse with defective Pol ζ function.

The researchers found *repro22* — a chemically induced mutant mouse — showed sterility with germ cell depletion, decreased body weight, and partial lethality during embryonic development. The abnormalities of the *repro22* mouse were identified as being caused by a mutation in *Rev7* gene encoding a subunit of Pol ζ .

Furthermore, cells of the *repro22* mouse showed decreased proliferation, increased apoptosis, and arrest of cell cycle with accumulation of DNA damage after treatment with the genotoxic agent.

These results demonstrated that Pol ζ is essential for mammalian development including germ cell development via repair of DNA damage.

Reference:

- Authors: Maryam Khalaj, Abdolrahim Abbasi, Hiroshi Yamanishi, Kouyou Akiyama, Shuso Wakitani, Sotaro Kikuchi, Michiko Hirose, Misako Yuzuriha, Masaki Magari, Heba A. Degheidy, Kuniya Abe, Atsuo Ogura, Hiroshi Hashimoto, and Tetsuo Kunieda
- Title of original paper: A missense mutation in *Rev7* disrupts formation of Pol ζ , impairing mouse development and repair of genotoxic-agent-induced DNA lesions
- Journal, volume, pages and year: *Journal of Biological Chemistry*, **289**, 3811 (2014).
- Digital Object Identifier (DOI): 10.1074/jbc.M113.514752.
- Journal website: <http://www.jbc.org/content/289/6/3811.long>
- Affiliations: Graduate School of Environmental and Life Science, Okayama University.
- Department website: http://www.gels.okayama-u.ac.jp/index_e.html

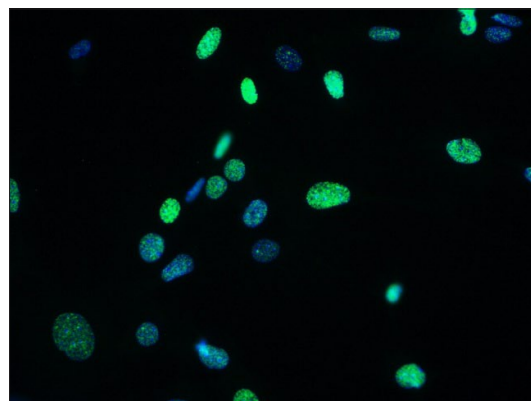


Figure caption: Accumulation DNA damages indicated by green color in cells of repro22 mouse.

Research Highlights

Bacterial Nanometric Amorphous Fe-Based Oxide: Potential of Lithium-Ion Battery Anode Material

Leptothrix ochracea is a species of iron-oxidizing bacteria that exists in natural hydrospheres where groundwater outwells worldwide. Intriguingly, the bacterium produces Fe³⁺-based amorphous oxide particles (ca 3 nm diameter; Fe³⁺:Si⁴⁺:P⁵⁺~73:22:5) that readily assemble into microtubular sheaths encompassing the bacterial cell (ca 1 μm diameter, ca 2 mm length, Fig. 1). The mass of such sheaths (named L-BIOX : Biogenous Iron Oxide produced by *Leptothrix*) has been usually regarded as useless waste, but Jun Takada and colleagues at Okayama University discovered unexpected industrial functions of L-BIOX such as a great potential as an anode material in lithium-ion battery.

Since use of the battery that is a powerful electric source for portable electric devices has expanded to a variety of new areas such as transportation and electric power storage, improvement of battery capability and effort to develop new electrode materials have been demanded. The general processes of nanosizing and appropriate surface modification which are required for tuning the battery property are complicated and cost-ineffective. By contrast, L-BIOX is a cost-effective and easily-handled electrode material, since its basic texture is composed of nanometric particles.

The charge-discharge properties of simple L-BIOX/Li-metal cells were examined at current rates of 33.3mA/g (0.05C) and 666mA/g (1C) for voltages of 0 to 3V over 50 cycles (Fig. 2). In addition, electronic and structural changes were microscopically analyzed by TEM/STEM/EELS and ⁵⁷Fe Mössbauer spectroscopy.

Results showed that L-BIOX exhibited a high potential as an Fe³⁺/Fe⁰ conversion anode material. Its capacity was significantly higher than the conventional carbon materials. Notably, the presence of minor components of Si and P in the original L-BIOX nanometric particles resulted in specific and well-defined electrode architecture. Since Fe-based electrochemical center is embedded in Si/P-based amorphous texture, an undesirable coagulation of Fe-based center is prevented.

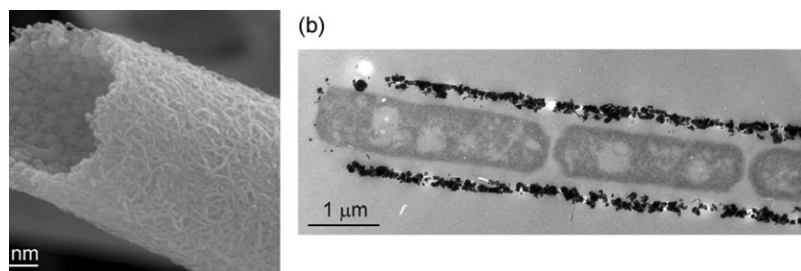


Figure 1. (a) High-magnification SEM image of L-BIOX. (b) TEM image showing a early stage of the formation of L-BIOX around rod-like bacterial cells lined up head to tail.

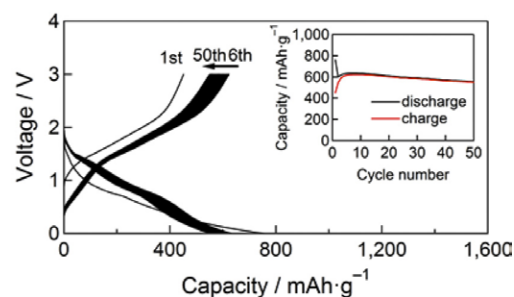


Figure 2. Charge-discharge curves at 666 mA/g between 0 and 3.0 V. Inset shows the cycle-life performance.

Takada and colleagues proposed a unique approach to develop new electrode materials for Li-ion battery. This is an example showing that the iron oxides of bacterial origin are an unexplored frontier in solid-state chemistry and materials science.

Reference:

- Authors: Hideki Hashimoto, Genki Kobayashi, Ryo Sakuma, Tatsuo Fujii, Naoaki Hayashi, Tomoko Suzuki, Ryoji Kanno, Mikio Takano, and Jun Takada
- Title of original paper: Bacterial Nanometric Amorphous Fe-Based Oxide; A Potential Lithium-Ion Battery Anode Material
- Journal, volume, pages and year: ACS Appl. Mater. Interfaces, 6(8), 5374–5378, 2014.
- Digital Object Identifier (DOI): 10.1021/am500905y
- Affiliation: Graduate School of Natural Science and Technology, Okayama University, JST CREST

▪ Intellectual Property and Enterprise

Synthesis of novel homeostasis modulators by "Westernized Kampo Medicine"

— Retinoid X Receptor Partial-Agonists Exert Anti-type 2 Diabetes Effects with Less Adverse Effects than Full-Agonists —

"Westernized Kampo Medicine" is a novel approach in modern medicine, defined by Dr. Hiroki Kakuta, that intends to exhibit the effects of Japanese Kampo Medicine with small molecules (Ref. 1). Japanese Kampo Medicine was developed in Japan, branching from traditional Chinese Medicine (Oriental Medicine). In contrast to Western Medicine, which has a well-regarded therapeutic method of treating diseases by using drugs focused on target molecules such as receptors or enzymes specifically related to each disease, Oriental Medicine is a systematic treatment based on consideration of a patient's homeostatic condition and environmental factors to determine a patient's well-being. In particular, Chinese herbs are one of the tools used for treatments in Oriental Medicine. Recent common diseases such as diabetes, Alzheimer's Disease, and cancer are considered to be closely related to patients' life styles, and are expected to be diagnosed and be treated by "Westernized Kampo Medicine".

Dr. Kakuta has recently demonstrated this new concept from his exploratory research on the study of Retinoid X Receptor (RXR). By this concept, a new drug, a small molecule as opposed to a Chinese herb of Oriental Medicine, was synthesized, selected and proved to work as a partial-agonist to its target molecule, which exerts significant efficacy with less adverse effects.

RXRs act as dimers that consist of peroxisome proliferator-activated receptors (PPARs), liver X receptors (LXRs) or other receptors (Figure 1). PPARs and LXRs are known to control glucose/lipid metabolism and develop anti-inflammatory effects through the suppression of NF- κ B. The heterodimers can be activated by RXR agonists alone (Permissive Effect). It is reported that RXR agonists have anti-diabetic and anti-inflammatory effects. However, the RXR agonists reported previously are full-agonists and lead to the elevation of the triglyceride (TG) level in blood, hypothyroidism, weight gain, and hepatomegaly. Dr. Kakuta and his colleagues hypothesized that these adverse effects are

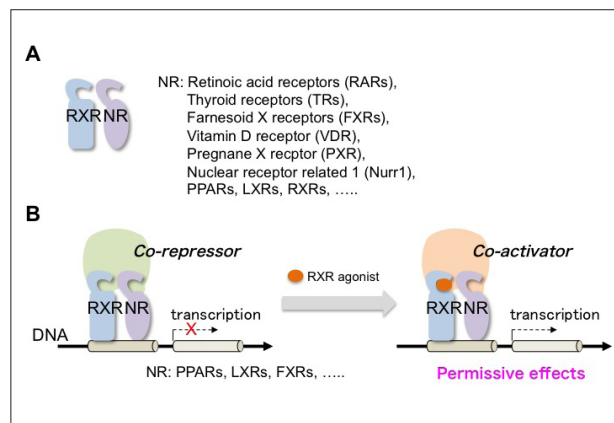


Figure 1. RXR heterodimer partners (A) and permissive effects (B). Dr. Kakuta and his colleagues have synthesized and selected two RXR partial-agonists CBt-PMN [$EC_{50} = 143$ nM, $E_{max} = 75\%$](ref. 2-5) and 6-[ethyl (4-isobutoxy-3-isopropylphenyl)amino]-3-pyridinecarboxylic acid (NEt-4IB, $EC_{50} = 169$ nM, $E_{max} = 55\%$)(ref. 6-8) and demonstrated that these compounds showed lower blood glucose levels on animal studies without adverse effects such as weight gain, elevated TG levels in blood or hepatomegaly (Figure 2). This study of the RXR partial-agonists supports our hypothesis on "Westernized Kampo Medicine", which could make a difference in new drug discovery research.

caused by the excessive activation of RXR as a full-agonist, and that more moderate activation of RXR as a partial-agonist is sufficient for exhibiting the desired drug efficacy.

Our synthesis method has the following features:

1. *Expert Opin. Ther. Pat.*, 24, 443–52, (2014).
2. *ACS Med. Chem. Lett.*, 3, 427–43 (2012).
3. *J. Med. Chem.*, 56, 1865–77, (2013).
4. JP5255994 B2
5. JP2013-177329A
6. Manuscript in preparation
7. JP4691619 B2, US8389538 B2, EP2116523 A1
8. JP2014-076953A

Contact: Mototaka Senda, Ph.D.,
 US & EU Representative of Intellectual Property Office,
 Okayama University, 2450 Peralta Blvd. #119, Fremont,
 CA 94536, USA
 Email: takasenda@okayama-u.ac.jp

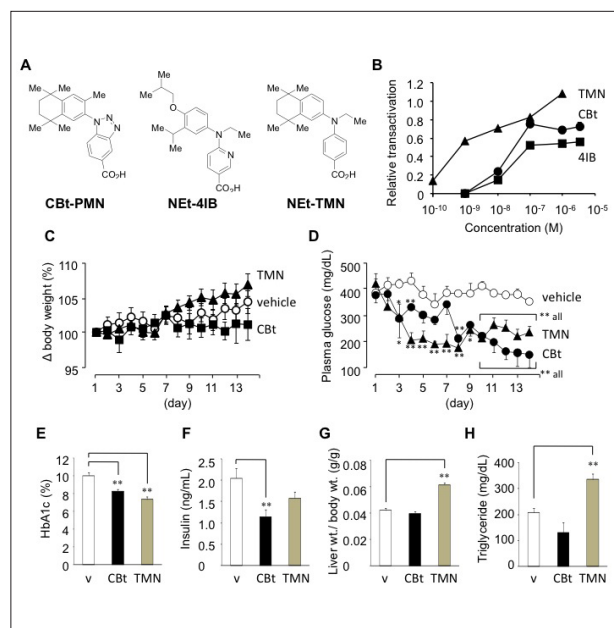


Figure 2. A) Chemical structures of CbT-PMN (CbT), NEt-4IB (4IB) and RXR full-agonist NEt-TMN (TMN). B) Dose-dependence of RXR α agonist activities of each compound. The transactivation activity is shown as relative activity based on the luciferase activity of 1 μ M RXR full-agonist bexarotene taken as 1.0. C) – H) Evaluation of antitype 2 diabetes effects of repeated oral administration of CbT and TMN at 10 mg/kg/day to male KK-Ay mice for 14 consecutive days. Data for vehicle control, CbT and TMN were taken from ref 2. Data shown are the average (n = 4–7) \pm SEM and analyzed by one-way ANOVA followed by Bonferroni test. Significant differences: * p < 0.05 vs vehicle. ** p < 0.01 vs vehicle. These data were quoted from reference 2 and modified.

■ Topics : Letters from alumni

Dr. Ahmed AL-Sultan

Statistical analyst

Directorate general of civil aviation, Kuwait International Airport.

Assistant Professor (part time), Statistics & Operations Research Department, College of science, Kuwait University.

I went to Japan in October 2008 after receiving a Japanese government "monbukagakusho scholarship", as a graduate student to Okayama University majoring in statistics. The staff and volunteer students at Okayama University were very helpful and kind. Before I moved to my own apartment, I lived in the dormitory for international students. The dormitory was very convenient since it is only a five minute walk to the campus.

Before I begin my research at the Graduate School of Environmental and Life Science, I studied Japanese language for one semester. There was another class called the "study of Japan" for studying Japanese culture. This class was very interesting since students learned many things such as observing and practicing the tea ceremony. Although I usually cooked Kuwaiti cuisine in my apartment, I really like Japanese food such as sushi, Okonomiyaki. Also, I really enjoyed the Sakura season in Okayama, and usually went with my friends to see the Sakura trees. In summer, there were many festivals where people wore Yukata and went to enjoy fireworks.

I usually spent most of my time in my lab doing research until the evening. My research advisor was very supportive and kind. I really appreciate his helpful support during my research. I finished my doctorate degree at Okayama University in March 2012 and stayed four months afterwards to continue my research. Then I returned to Kuwait and now I'm working at Kuwait International Airport as a statistical analyst and also as a part time assistant professor at Kuwait University.



Participating at a conference in Hokkaido



Going snowboarding

I'm so glad to have had the opportunity to study at Okayama University. I learned a lot about Japanese culture and made many friends. To me, Okayama is my second home. I'm looking forward to visit Japan again soon.



In front of Tokyo Tower



Participating in a conference with Professor Koji Kurihara

■ Topics : Okayama Travelogue

International research: Collaborative Research Center of Okayama University for Infectious Diseases in India

An estimated 6.9 million children under the age of five die every year with 0.6 million of these deaths being due to acute diarrheal diseases in developing countries — this is more deaths than AIDS or measles. More specifically, in India 0.2 million children die of acute diarrheal diseases, underscoring the need for urgent solutions to prevent the deaths of so many children.

Scientists at Okayama University are working with counterparts in India in conducting active surveillance of the environment in Kolkata in search of pathogens responsible for deaths due to diarrhea.

"The Collaborative Research Center of Okayama University for Infectious Diseases in India" was established in 2007 as part of the "Founding Research Centers for Emerging and Reemerging Infectious Diseases" program launched by MEXT," says Sumio Shinoda, director of the center. "We are working with the National Institute of Cholera and Enteric Diseases, Kolkata, to survey microorganisms, viruses, and parasites responsible for diarrheal pathogens."

The other members of the Okayama University team conducting research in Kolkata are Daisuke Imamura, and Tamaki Mizuno.



National Institute of Cholera and Enteric Diseases, Kolkata



Dr. Tamaki Mizuno, Dr. Sandipan Ganguly, Dr. Asish Kumar Mukhopadhyay
Dr. Sumio Shinoda, Dr. Daisuke Imamura (from the left)

Research areas include:

- Hospital-based active surveillance of diarrheal diseases at two major hospitals in Kolkata.
- Development of *Shigella* vaccine with initial tests showing heat-killed vaccine to be effective to shigellosis in guinea pig and suckling mouse models.
- Studies on viable but non-culturable (VBNC) *Vibrio cholerae*, where VBNC *V. cholerae* cells were successfully converted to culturable cells by co-cultivation with mammalian intestinal cells.
- Research on pathogenic mechanisms of diarrheal diseases including the binding of Rotavirus to intestinal cells, and production and maturation of enterotoxigenic protein toxins.
- Research on pathogenic mechanisms of enteric parasites.

The research also includes the development of oral vaccines and elucidating the mechanisms of diarrheal diseases due to *V. cholerae*, enterotoxigenic *Escherichia coli*, and Rotavirus.

■ Topics : Club Activities

Okayama University figure skating club

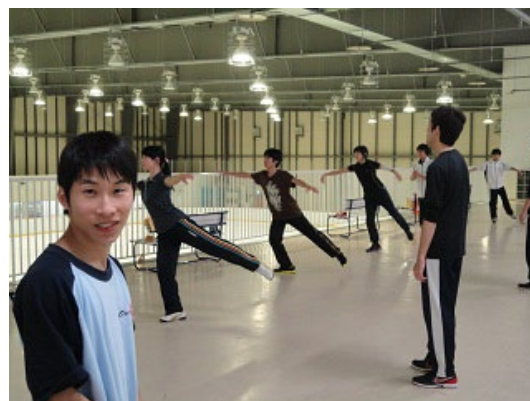
"The Okayama University Figure Skating Club was set up in 1987," says Souma Kobayashi, the captain of the club and a 4th year student of the Matching Program Course. "We currently have six members. We practice regularly at the Okayama International Skate Rink, which is conveniently located and reasonably priced."

Most of the newcomers are inexperienced when they join the club. "Graduates teach new members," says Yoji Tsuboi, a 4th year student of the Matching Program Course. "Beginners learn to go from simple walking to making simple spins within a few months. Being able to do the axel jump is the minimum requirement for participating in competitions."

Tsuboi succeeded in attaining first place in the individual competition at the Japan Collegiate Ice Sports Championships, held in Hokkaido on 7-8 January 2014. He has been 3rd place in the group event for two consecutive years.

Okayama Prefecture has been the birth place of many internationally renowned Japanese figure skaters, including Daisuke Takahashi. "Okayama has excellent facilities for figure skating," says Tsuboi. "We practice two days per week at the rink as well as regular exercise in the gym. It's really enjoyable. Join us!"

Okayama University figure skating club website:
<http://www.geocities.jp/okayamafsc/>



Practising in the gym



Practicing at the Okayama International Ice Rink



At an inter-collegiate competition