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岡山大学 OKAYAMA UNIVERSITY | SUSTAINABLE DEVELOPMENT GOALS

"Okayama University supports the Sustainable Development Goals"

1-1-1 Tsushima-naka, Kita-ku, Okayama 700-8530 Japan

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Natural Resources Management Officer, FAO
Junko Nakai

From the Millennium Development Goals to the Sustainable Development Goals

Okayama University invited Dr. Nakai to talk on the SDGs on October 24, 2017

The eight **Millennium Development Goals** (MDGs) were the first of its kind to bring together the nations around the world to work toward concrete global targets in development. The MDGs envisioned to create a world by 2015, in which the proportion of people suffering from extreme poverty and hunger was halved as well as that from lack of sustainable access to safe drinking water, the spread of HIV/AIDS was contained, universal primary education was achieved with gender parity, the mortality rate of children under five was reduced by two-thirds, and environmental considerations were integrated into country policies and programmes.

The MDGs were signed by 189 countries and monitored with 21 targets and 60 indicators. At their conclusion, the targets met were on: extreme poverty, access to safe drinking water, living conditions of slum dwellers, gender disparity in primary and secondary education, and incidence of malaria. The other targets, in particular those related to education and health were achieved successfully by very few of the signatory countries, about 10-20%.

The causes of shortfall were identified by many, ranging from insufficiency in commitment, resources, focus and accountability to limitations in various other aspects: the elaboration process (the consultation was not sufficiently inclusive), the structure (the variations among countries and the linkages between the Goals were neglected), the content (equity, equality and environmental issues were not properly addressed) and the implementation and enforcement (reliable and comparable data and evidence on feasibility were scarce, and no practical roadmap existed). The MDG framework has been summed up as one that rests on the idea of "rich helps the poor." The international agencies adjusted, estimated, or modeled close to half of the data used by the MDGs, which led to policy implications divergent from what was based on national data.

The **Sustainable Development Goals** (SDGs) encompass the goals set forth by the MDGs and much beyond, with 17 goals, 169 targets and 232 indicators. The SDGs are more inclusive in scope and approach the topics of inequality and sustainability as universal themes; they define themselves to be the goals for the humanity and the planet, and pledge to leave no one behind. Consequently, the SDGs are more ambitious than the MDGs in their targets; instead of halving the population in poverty, for example, the SDGs aim to eradicate poverty. Unlike the MDGs, the SDGs recognize that development is not a purely economic phenomenon, but also a matter of inclusiveness and the environment; these elements are interconnected and the latter two need to be fully mainstreamed for development in the true sense of the word. The formulation process of SDGs was global in scale and through intensive stakeholder engagement.[1] The worldwide stakeholder engagement continues into the implementation phase through the **Partnerships for the SDGs online platform**.

Some of the criticisms of the MDGs are carried over to the SDGs, namely that the Goals are unrealistic, lack legal binding, and leave room for political maneuvering at the national level. The question of how to obtain reliable, disaggregated data at the national level is yet to be resolved. A review of the SDG targets concluded that among the total 169 targets, 49 were well developed, 91 could be strengthened by being more specific, and the remaining 29 required significant revision for practical use.

The Food and Agriculture Organization of the United Nations and the SDGs

The **Food and Agriculture Organization of the United Nations** (FAO) has chosen **Goal 2** of the SDGs, as its flagship Goal: **"End hunger, achieve food security and improved nutrition and promote sustainable agriculture,"** or **"Zero hunger"** for short. It is a natural choice given that the Organization's mandate is to support members in their efforts to ensure that people have regular access to enough high-quality food. Its five **Strategic Objectives** as well as many of its initiatives are in line with the Goal.[2] The **Committee on Agriculture** (COAG) – a governing body under FAO – has more than 100 member-nations and provides policy and regulatory guidance on agriculture, livestock, food safety, nutrition, rural development and natural resources management. The Organization has also established a platform called the **Global Partnership Initiative for Plant Breeding Capacity Building** (GIPB), which is an information clearing house for sustainable use of plant genetic resources for food and agriculture. The **Committee on World Food Security** (CFS) is an inclusive international and intergovernmental platform to ensure food security and nutrition for all. It develops and endorses policy recommendations and guidance on food security and nutrition, and reports to the UN General Assembly and FAO Conference. The **Codex Alimentarius** is a collection of standards, guidelines and codes of practices for the purpose of ensuring consumer health and fair practices in food trade. Its Commission is housed under the Joint FAO/WHO Food Standards Programme.

In relation to the SDGs, the **key messages of the FAO** have been officially defined as: food and agriculture

can contribute massively to achieving the SDGs; FAO is supporting countries in achieving the 2030 Agenda;[3] and, we achieve Zero Hunger if we work together. FAO has made a commitment to end extreme poverty, hunger and malnutrition, to promote sustainable agriculture and sustainable use of biodiversity and natural resources for development, and to fight against and building resilience to climate change. The SDGs aim to be strategies that are nationally owned and supported by integrated national financial framework. In this context, FAO assists member countries to achieve transformational changes proposed by the SDGs through designing, implementing, and monitoring policies, programmes, investments and partnerships at national and regional levels.

FAO believes that SDG 2 calls for accelerated investment in food and agriculture, which will be catalytic for changes across all Goals. The goal of zero hunger will necessarily end extreme poverty, hunger and malnutrition, and promote sustainable management of natural resources. Moreover, moves toward zero hunger will require mitigating climate change, while adapting and building resistance to it. In other words, food and agriculture represent the fundamental connection between people and the planet, and FAO's commitment to end hunger will contribute toward achievement of no poverty (**Goal 1**), good health and well-being (**Goal 3**), gender equality (**Goal 5**), clean water and sanitation (**Goal 6**), decent work and economic growth (**Goal 8**), industry, innovation and infrastructure (**Goal 9**), reduced inequalities (**Goal 10**), responsible consumption and production (**Goal 12**), climate action (**Goal 13**), life below water (**Goal 14**), life on land (**Goal 15**), and peace, justice and strong institutions (**Goal 16**).[4]

Monitoring the SDG Targets

Each global **SDG indicator** has a **'custodian' agency** assigned by the **UN Inter-agency and Expert Group on SDG indicators**, a working group of the UN Statistical Commission. Their responsibilities lie in compilation, verification and aggregation of country data and metadata as well as in submission of the data to the

United Nations Statistics Division. Tasks such as development of international standards, recommendation of monitoring methodologies and strengthening national monitoring and reporting capacity also fall on the shoulders of these agencies so that the country data would be internationally comparable. In case data estimation or adjustment is required, the agencies will engage the country in question to carry it out. FAO is custodian of 21 indicators[5] and assumes a lesser role of a contributing agency for 4 additional ones.[6]

FAO has long been engaged in relevant data collection and analysis. It monitors: the **FAO Food Price Index**, a measure of the monthly change in international prices of a basket of food commodities; **FAOSTAT**, a country-specific information on production, trade, inputs, emission, investment, and so on, all in relation to agriculture; the **State of Food Insecurity in the World** provides data on undernourishment by country and region. The **Agricultural Market Information System** (AMIS), whose Secretariat includes FAO, unites the major trading countries of agricultural commodities to assess global food supplies and to provide a platform to coordinate policy actions when commodity markets are volatile. The **Global Food Market Information Group** functions under AMIS to provide reliable, accurate, timely and comparable market and policy data and information. The COAG activities are supported by the **Monitoring and Analyzing Food and Agricultural Policies** (MAFAP) program; it collects, assembles and uses policy-relevant data –such as prices, market access costs and public expenditure as well as policy decisions – in the food and agriculture sector in fifteen developing countries.

The progress thus far with respect to zero hunger suggests that we need to accelerate our efforts. At the present rate of advancement, hunger will persist beyond 2030 and achieving the 2020 target on maintaining genetic diversity will be difficult. Malnutrition still affects an alarmingly high number of children under age 5, and foreign and domestic official investments in agriculture are lagging.

Challenges Behind the Scenes – Coordination, Data Collection and Communication

All of the SDGs have been chosen as goals in one way or another before, but never as a set of goals to be implemented in an integrated manner. The organizations involved are required to coordinate with each other, another long-standing issue to be realized.

Assessing the results of our actions, or monitoring, is crucial in achieving progress toward the goals. While data are necessary but not sufficient for meeting any goal, we can say that attainment of the SDGs would greatly depend on accurate and timely data that are analyzed systematically and made available to the public. If we are to leave no one behind and be truly inclusive, data on different social groups, namely disaggregated data, is indispensable. In fact, one of the important lessons learned from our MDG experience is that, although the goals are globally stated, the world is quite heterogenous and we need to pay attention to the divides – rural-urban, regional, demographic and income – so that development would

be attained by all, and hence sustainable. Unfortunately, disaggregation is not yet widely adopted by the national statistical systems. As much as SDGs are ambitious, they venture into territories where regular data collection is not a routine.[7] In many countries, administrative statistics – including civil registration and other fundamental data – need to be strengthened for full participation in the SDGs, which are based on the principle of national ownership. FAO is recognized as one of the key institutions in developing methods and standards for food and agriculture statistics and in providing assistance to countries in need in the field of monitoring.[8]

Finally, for galvanizing the public to take actions toward the SDGs, it is crucial to communicate with them frequently in an engaging and consistent manner. FAO has devised a communication strategy to that end, whose key message is: food and agriculture are the fundamental connection between people and the planet, and its commitment to end hunger will contribute toward achievement of the Sustainable Development Goals.

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[1] During the first United Nations Conference on Environment and Development in 1992, nine sectors of society were formally distinguished as "Major Groups," through which broad participation would be facilitated in the UN activities on sustainable development: women, children and youth, indigenous peoples, non-governmental organizations, local authorities, workers and trade unions, business and industry, scientific and technological community, and farmers. The inputs from the Major Groups and other stakeholders on the SDGs were coordinated by the Department of Economic and Social Affairs of the United Nations through its Stakeholders Engagement Programme, which included online questionnaire that was accessible to anyone with internet connection. An Open Working Group of the General Assembly was tasked with preparing a proposal on the SDGs, most of whose 30 seats were shared by several countries.

[2] The Strategic Objectives of FAO are: help eliminate hunger, food insecurity and malnutrition; make agriculture, forestry and fisheries more productive and sustainable; reduce rural poverty; enable inclusive and efficient agricultural and food systems; and increase the resilience of livelihoods to threats and crises.

[3] The SDGs are laid out in Transforming Our World: the 2030 Agenda for Sustainable Development. General Assembly Resolution, 70/1 of 25 September 2015. A/RES/70/1.

[4] It has been argued that other SDGs could also be simultaneously promoted by our efforts to end hunger. Hunger is related to education (Goal 4), as chronic malnutrition reduces intellectual capacity. Zero hunger is achievable by practicing sustainable agriculture, which most likely relies on affordable, easily accessible, and reliable energy supplies for operating machineries, including those for post-harvest processing, storage and transportation; it is related to Goal 7, affordable and clean energy. Finally, zero

hunger is in synch with sustainable cities and communities (Goal 11), because improvements in food and nutritional security, in addition to more sustainable food production, would give a push toward inclusiveness and sustainability of cities.

[5] It concerns nine indicators under Goal 2, Zero hunger (Hunger, Severity of food insecurity, Productivity of small-scale food producers, Income of small-scale food producer, Agricultural sustainability, Conservation of genetic resources for food and agriculture, Risk status of livestock breeds, Public investment in agriculture, Food price volatility); two under Goal 5, Gender equality (Women's ownership of agricultural land, Women's equal rights to land ownership); two under Goal 6, Clean water and sanitation (Water use efficiency, Water stress); one under Goal 12, Responsible Consumption and Production (Global food losses), four under Goal 14, Life below water (Fish stocks sustainability, Illegal, unreported unregulated fishing, Value added of sustainable fisheries, Access rights for small-scale fisheries); and, three under Goal 15, Life on land (Forest area, Sustainable forest management, **Mountain Green Cover Index**). Mountain Green Cover Index is an indicator developed by FAO to monitor Target 15.4: "By 2030, ensure the conservation of mountain ecosystems, including their biodiversity, to enhance their capacity to provide benefits that are essential for sustainable development." The Index measures changes of the green vegetation in mountain areas, on the recognition of a positive correlation between green coverage of mountain areas and their state of health and capacity to fulfil their ecosystem roles.

[6] One indicator under Goal 1, No poverty (Disaster economic loss); one under Goal 14, Frameworks for conservation and sustainable use of oceans' resources) and two under Goal 15, Life on land (Land degradation, Frameworks for fair and equitable sharing of genetic resources' benefits).

[7] An example of a novel statistics is the **Food Insecurity Experience Scale**. It is an estimate of the proportion of the population facing difficulties in accessing food, at different levels of severity, based on data collected through interviews.

[8] Most of the FAO's statistics programmes mentioned above already contain strengthening of national capacities in data collection and analysis. One of the new methodologies that FAO promotes is the **Agricultural Research Information System** (AGRIS): collection of consistent and accurate data for integrated agricultural survey systems at national and subnational levels, using Computer-Assisted Interviewing techniques.

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■ Feature

Okayama University establishes the SDGs Promotion Headquarters

In 2017 Okayama University held the world's first international conference on the attainment of SDGs in Okayama City in cooperation with other organizations. Notably, Okayama University was the only national university to be a recipient of the first Japan SDGs Awards organized by the Japanes Government.

This year Okayama University continues to undertake more wide ranging activities to lead the world. First, Vice Executive Director and Senior University Global Administrator (UGA) Atsufumi Yokoi gave a speech at the Global Festival of Action for Sustainable Development, held in Bonn, Federal Republic of Germany from March 21 to 23, 2018. This festival is an international conference held annually by the United Nations SDG Action Campaign to introduce the efforts of organizations that have received SDGs-related awards.

Vice Executive Director and UGA Yokoi giving a speech

He introduced the University's efforts to promote the SDGs and delivered a message stating that the University will take a strong lead from the Okayama area, encouraging people throughout the world to implement the SDGs. After his speech at the conference, he said, "The formulation of the SDGs made us realize that the efforts towards sustainable development that the Okayama area and Okayama University had facilitated over a long period of time were worthy of attracting worldwide attention. It is important for us to deliver a strong message to the world from Okayama and Japan in the future."

In March 2018, to celebrate the 25th anniversary of the Convention on Biological Diversity and share efforts at all levels from local to global to help conserve biodiversity and achieve the SDGs, the International Day for Biological Diversity Symposium "Biodiversity and SDGs" was hosted by the Ministry of Environment, Okayama University, United Nations University Institute for the Advanced Study of Sustainability (UNU-IAS), Global Environment Outreach Centre (GEOC), and Sustainable Development Solutions Network (SDSN) Japan at the Elizabeth Rose Conference Hall in the United Nations University (Shibuya City, Tokyo).


President Makino introduced an effort for the SDGs

President Hirofumi Makino delivered a lecture titled "Partnerships Resonating with Each Other—Okayama University's Initiatives for Contributing to the SDGs." Citing specific cases, President Makino introduced Okayama University's own process of making STI (Science, Technology and Innovation) for the SDGs a reality to solve social challenges, a role that should be played by universities, while strengthening partnerships with other organizations in other regions and countries.

In the latter half of the symposium, a panel discussion was held with the theme of Biodiversity and SDGs with Dr. Chigusa Hanaoka, Senior Research Administrator at Okayama University acting as the facilitator. Panelists representing business, academic and governmental organizations shared their specific actions at Okayama Prefecture to conserve biodiversity and help achieve the SDGs. They highlighted the fact that such actions at the local level help make local communities more attractive and that these actions need to be replicated throughout Japan and the rest of the world. They also discussed the role of academic institutions in human resource development and technical support. Then Dr. Hanaoka concluded the panel discussion by summarizing the initiatives of business, academic and government circles to continue and develop biodiversity conservation activities while pursuing the SDGs. At the end of the symposium, Mr. Naohisa Okuda, director of the Biodiversity Policy Division, Nature Conservation Bureau, Ministry of the Environment delivered the closing address.

In addition, Okayama University is also putting efforts into activities rooted in local Okayama. The University hosted the Health Festa in Okayama for the first time with the Sanyo Shimbun Co., Ltd. and some other organizations at Okayama Convention Center on May 3 and 4.

This year's festa, which was held as a project commemorating the 150th anniversary of Okayama University's Medical School and as a project that can help achieve the Sustainable Development Goals (SDGs), was designed to encourage all people of all ages to live a heathy life, thereby contributing to their welfare.

The event featured two special lectures and 18 open lectures offered by faculty members from Okayama University and other academic institutions as well as exhibition and hands-on-learning booths for health and medical information. During the two days, a total of about 4,000 visitors deepened their knowledge about health.

In the open lectures, speakers explained how to treat and prevent familiar disorders such as locomotive syndrome, lifestyle diseases and dementia. The audience listened intently, taking pictures and notes.

Exhibition and hands-on learning booths included the SDGs Promotion Booth, which informed visitors about the University's efforts to help achieve SDGs, the Okayama University Hospital Division of Nursing's Booth, and corporate sponsors' booths.

From now on, the University will promote efforts to achieve SDGs. In cooperation with the world, we will continue our strong and steady unique activities that can only be done in Okayama based on the "fruitful academic capital" of Makino Vision.

Further information

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About an approach to SDGs of Okayama University (Japanese page)
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■ News

The Graduate School of Interdisciplinary Science and Engineering in Health Systems was established in April 2018

The Graduate School of Interdisciplinary Science and Engineering in Health Systems was established in April 2018 as the eighth graduate school of Okayama University.

Under the theme of "health systems," which deal with challenges in real-life healthcare situations, the Graduate School focuses on developing students' problem-solving skills—they learn to use a cycle of identifying problems and their backgrounds, analyzing the problems, developing solutions, and then implementing the solutions to improve real-life situations in a scientific way. The Graduate School is the first in 13 years established by Okayama University.

Its signboard unveiling ceremony was held on April 5.The ceremony was attended by President Hirofumi Makino, Executive Director and Executive Vice President for Planning, Evaluation and General Affairs Dr. Kayo Takahashi, about 50 faculty and staff members, including Dean of the Graduate School Dr. Masaharu Seno, and about 80 master's and doctoral course students (the very first students of the graduate school). At the ceremony, President Makino said, "It's important for the University to establish graduate schools that can meet the demands of the times to promote necessary research." Dr. Seno said, "Individual efforts and cooperation by all faculty and staff members and students are essential in making this graduate school perfectly unique and meaningful."

President Hirofumi Makino, Dr. Kayo Takahashi, and Dr. Masaharu Seno unveiled the signboard

On June 23, Okayama University held an event to celebrate the establishment of the Graduate School. The celebration event was attended by many people including local public officials and corporate representatives. Congratulatory speeches were made by Mr. Yutaka Takimoto, Deputy Director-General for Coordination between Upper Secondary Schools and Universities and Higher Education Bureau, the Ministry of Education, Culture, Sports, Science and Technology; Dr. Stephen Lanier, Vice President for Research and Dr. Ahmad Ezzeddine, Associate Vice President for Educational Outreach and International Programs, both from Wayne State University in the U.S.; and


Mr. Yutaka Takimoto delivered a congratulatory address

Mr. Hisashi Matsuda, Chairperson of System Engineering Okayama and Former Chairperson of the Okayama Association of Corporate Executives. President Hirofumi Makino emphasized in his greeting how well the Graduate School matches the trends of the times. Subsequently, Dr. Masaharu Seno, Dean of the Graduate School, referred to various challenges of modern society, such as the aging population alongside the declining birthrate and deadlocked regional economies and explained the purpose of the Graduate School by saying, "We promote innovative education and research through collaborations between medicine and engineering and through the integration of arts and sciences, and develop students into excellent human resources capable of identifying problems, creating things and ideas that can solve the problems, and then putting them to actual use in society, thereby minimizing social challenges and contributing to everyone's benefit."

Further information

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■ News

Second visit of Communauté Université Grenoble Alpes Delegation to Okayama University: strengthening a "promising powerful partnership"

A delegation from Communauté Université Grenoble Alpes in France visited President Hirofumi Makino at Okayama University on May 15, 2018.

Group photograph to commemorate the visit

Communauté Université Grenoble Alpes and Okayama University signed a university-level agreement of cooperation and student exchange appendix in September 2015.

This was the second visit since May 2017, offering the opportunity to review all collaborative activities presently ongoing and those to be possibly developed.

Session to exchange views on collaborative activities

The delegation consisted of Ms. Elisa Glangeaud, Head of International Relations Office at the Communauté Université Grenoble Alpes, Ms. Sandrine Vernet, Head of International Affairs at Sciences Po Grenoble, and Ms. Caroline Pieton, International Relations Officer at Grenoble Institute of Polytechnique de Grenoble.

During the meeting, President Makino and Ms. Glangeaud exchanged views on our partnerships, and a common future vision was recognized in “Achieving fruitful academic capital and further strengthening our collaborations, particularly via medical-related ones.”

Subsequently on the same day, an exchanging session was held also with our researchers and the students from Communauté Université Grenoble Alpes. It was opened by Executive Vice-President for Research, Daiji Takeuchi, giving a brief introduction of recent activities of Okayama University. At the session the representatives from Okayama University explained the Graduate School of Natural Science and Technology and its research, the Discovery Program for Global Learners, the ERASMUS+ International Credit Mobility (ICM) program, Global Science Campus in Okayama, and several joint research collaborations with Communauté Université Grenoble Alpes. The session was concluded with the closing remarks by Ms. Glangeaud, evaluating the results of our recent partnership and promising powerful collaborations.

Both universities could reconfirm our strong partnership through this visit. We will have a further relationship in wide-ranging fields of research and education.

Further information

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Okayama University (Japanese page)
http://www.okayama-u.ac.jp/tp/news/news_id7588.html

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■ News

Okayama University Hospital successfully completes the first lung transplant between two people of different sizes in Japan

On April 27, Okayama University Hospital successfully completed a lung transplant between two people of different sizes—a brain-dead donor and a female patient (recipient) in her 50s suffering from a serious lung disease. This was the first lung transplant of this kind in Japan since the Ministry of Health, Labour and Welfare revised the organ transplant guidelines in March 2014 to allow recipients smaller than brain-dead donors to receive an organ transplant.

The operation was performed by Dr.Oto and staff

The female patient in her 50s was suffering from interstitial pneumonia, a complication from connective tissue disease. She had no choice but to receive a lung transplant for her survival, but she had no living relatives who were able to give her a lung. Since her lungs became too small for her frame and her interstitial pneumonia was progressing quickly, she was put on the Japan Organ Transplant Network's waiting list on March 5, 2018. Her lung transplant operation, which was performed by Dr. Takahiro Oto, a professor at Okayama University Hospital Organ Transplant Center, started around 11am on April 27. A part of each lung from the brain-dead donor was transplanted into each of the patient's lungs. The operation was finished in about seven and a half hours. The patient is in stable condition and is expected to leave the hospital in about three months.

Professor Oto said, "Up until now, patients have never been selected as transplant candidates unless their lungs have been almost the same size as the donors' lungs. With the revised guidelines that allow more patients to become candidates for lung transplants, we'd like more pediatric patients and small adult patients to receive lung transplants."

Further information

Okayama University (English page)
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Okayama University (Japanese page)
http://www.okayama-u.ac.jp/tp/news/news_id7538.html

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■ News

Yutaka Hani, a member of the Shogi Club, gains revenge for his last year's defeat and becomes the student shogi meijin master

Yutaka Hani, a fourth-year student at the Faculty of Law and member of the Okayama University Shogi (Japanese Chess) Club won the 74th Student Shogi Meijin Tournament held in Tokyo on May 26 and 27. It was his first victory in the tournament in his final year at the university after taking second place in the same tournament last year.

Mr. Hani, a member of the Okayama University Shogi Club

A total of 32 strong amateur student players who advanced from the regional preliminaries fought fiercely during this two-day tournament. Hani will participate in the 12th Asahi Cup Shogi Open Tournament scheduled in July as a representative of amateur student shogi players and compete against professional players. He will also be invited to participate in the 47th Student Shogi Osho Tournament, a national individual shogi tournament for college students scheduled in December.

Mr. Hani (right) playing with members

Hani commented about his victory: "Since I became a fourth-year student, I've been busy and haven't been able to spend much time practicing. So no one was more surprised than me that I won the tournament. It was good to be able to take it easy and enjoy playing shogi. I'll do my best in games with professional players and try to learn from them."

Further information

Okayama University (English page)
http://www.okayama-u.ac.jp/eng/news/index_id7729.html

Okayama University (Japanese page)
http://www.okayama-u.ac.jp/tp/news/news_id7600.html

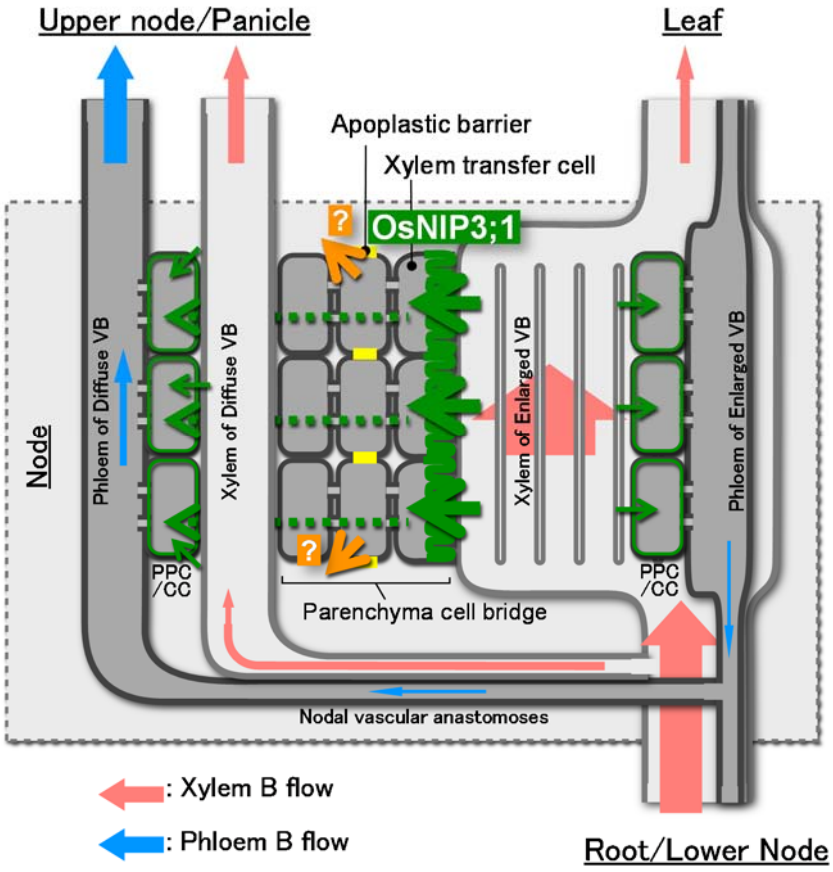
■ Research Highlights

Preferential delivery of boron to developing tissues in rice

Boron is an essential element for plant growth and development. In particular, developing tissues such as meristem require high amounts of boron for their active growth. However, it is not known how boron is preferentially delivered to these tissues with low transpiration.

Now, Jian Feng Ma and his colleagues at the Institute of Plant Science and Resources report that a transporter (OsNIP3;1) expressed in rice nodes is responsible for the preferential distribution of boron to the developing tissues. OsNIP3;1 is polarly localized at the xylem parenchyma cells of enlarged vascular bundles of nodes facing towards the xylem vessels. Knockout of this gene resulted in decreased distribution of boron to new leaves but increased distribution to old leaves causing inhibition of new leaf growth. Furthermore, this transporter responded to environmental boron changes at both transcriptional and protein levels.

This work revealed a novel mechanism for preferential distribution of boron in plants and will contribute to breed boron -use efficiency crops under boron-limited conditions in future.



Role of OsNIP3:1 in preferential distribution

Reference:

Authors

Ji Feng Shao, Naoki Yamaji, Xin Wei Liu, Kengo Yokosho, Ren Fang Shen and Jian Feng Ma

Title of original paper

Preferential Distribution of Boron to Developing Tissues Is Mediated by the Intrinsic Protein OsNIP3

Journal, volume, pages and year

Plant Physiology **176**, 1739–1750 (2018).

Digital Object Identifier (DOI)

10.1104/pp.17.01641

Journal website

http://www.plantphysiol.org/

Affiliations

Institute of Plant Science and Resources, Okayama University

Department website

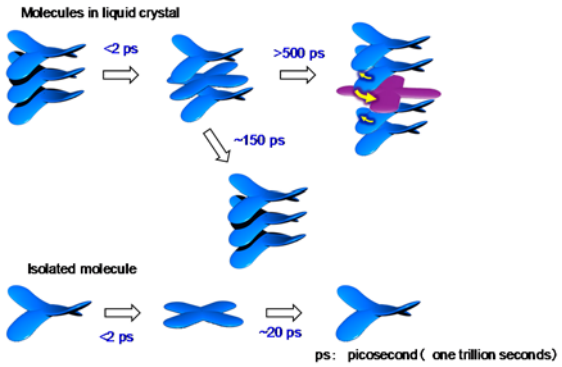
http://www.rib.okayama-u.ac.jp/plant.stress/index.html

Research Highlights

Movie of molecules in liquid-crystal – molecular motions in one trillionth seconds

The motion of molecules in liquid crystal phases has been used for wide ranging industrial applications, such as displays for televisions and computers. Therefore, there is demand for the development of methodology to identify the key motions of molecules in liquid crystals for their functions.

However, no such methodology exists to directly observe the dynamics of molecules in liquid crystals.



Observed molecular motions.

Here, Masaki Hada and colleagues at Okayama University, Kyoto University, Kyushu University, Tsukuba University, Tokyo Institute of Technology, Nagoya University, Kiel University, the University of Toronto, and Max Planck Institute describe the development of methodology to directly capture the motions of π-extended cyclooctatetraene molecules in liquid crystals.

The methodology consisted of a combination of two different measurements: (1)time-resolved electron diffraction to observe the molecular periodicity changes with atomic spatial resolution and temporal resolution of one trillionth seconds; and (2) time-resolved mid-infrared vibrational spectroscopy to observe the conformational change of an isolated molecule with the relevant temporal resolution.

The chain-motions of π-extended cyclooctatetraene molecules in liquid crystals was revealed, that is, conformational change from saddle to flat structure and subsequent rotational motion induced by steric effect.

This methodology could be also be applied for the observation of molecular dynamics in the photoresponsive functional soft materials containing azobenzene as well as the structural monitoring of photoactive sites in biological systems such as membrane proteins operating in optogenetics and photopharmacology.

Reference:

Authors

Masaki Hada, Shohei Saito, Sei'ichi Tanaka, Ryuma Sato, Masahiko Yoshimura, Kazuhiro Mouri, Kyohei Matsuo, Shigehiro Yamaguchi, Mitsuo Hara, Yasuhiko Hayashi, Fynn Röhricht, Rainer Herges, Yasuteru Shigeta, Ken Onda, R. J. Dwayne Miller

Title of original paper

Structural Monitoring of the Onset of Excited-State Aromaticity in a Liquid Crystal Phase

Journal, volume, pages and year

Journal of the American Chemical Society **139**, 15792 – 15800 (2017).

Digital Object Identifier (DOI)

10.1021/jacs.7b08021

Journal website

https://pubs.acs.org/doi/abs/10.1021/jacs.7b08021

Affiliations

Department of Engineering, Electrical Engineering, University of Cambridge.

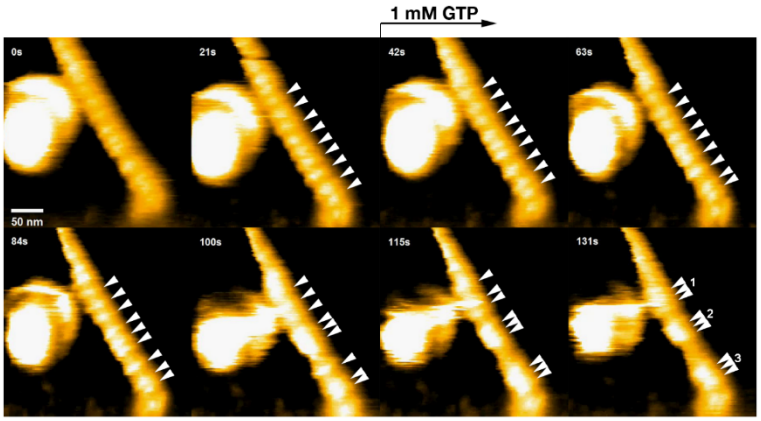
Department website

http://www.ec.okayama-u.ac.jp/%7Edm/

■ Research Highlights

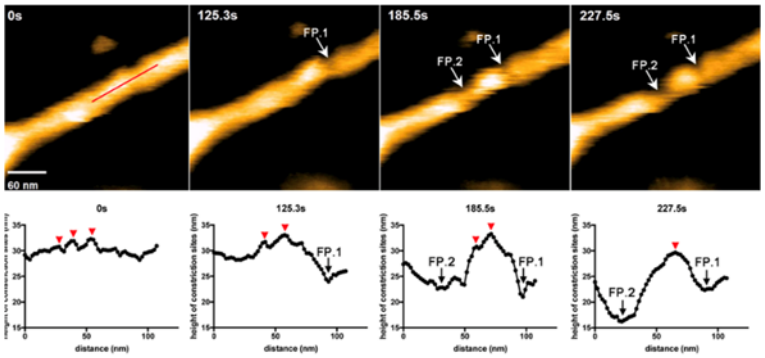
Unveiling “nano-scissors” required for endocytosis of synaptic vesicles

The nerve cells that make up a nervous system connect at junctions known as synapses. When a nerve impulse reaches the end of the cell, membrane-bound packages called synaptic vesicles fuse with the surface membrane and release their contents (neurotransmitters) to relay the signal to the next cell. The fused vesicles must be retrieved to make new vesicles, ready to transmit more signals across the synapse using the process known as endocytosis.



(Figure1)HS-AFM image of clustering dynamin-amphiphysin helices (arrowheads) upon GTP hydrolysis.

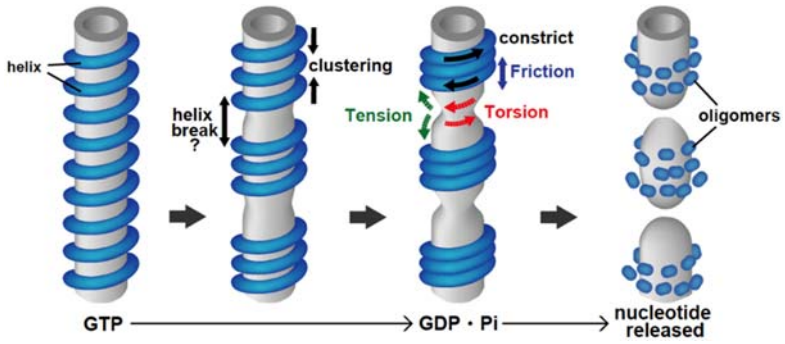
Two proteins named dynamin and amphiphysin cooperate in this process. Dynamin is a protein that acts like a motor; it breaks down a molecule called GTP to release energy. Previous studies have shown that dynamin-amphiphysin complexes join end to end to form long helical structures, but their precise mechanism has remained elusive.



(Figure2)Membrane fission occurs at the protein-uncoated regions flanking dynamin-amphiphysin clusters (arrows marked with FP.1 and FP.2)

Now, Tetsuya Takeda and colleagues at Okayama University, Kanazawa University, and Nagoya University have looked at how the structure of the helices changes during endocytosis.

Using high-speed atomic force microscopy (HS-AFM) that allows imaging of the molecular dynamics in high resolution both in space (sub nm) and time (sub mS), the team successfully imaged dynamic structural changes of dynamin-amphiphysin complexes during membrane fission.



(Figure3)Clusterase model of membrane constriction and fission mediated by dynamin-amphiphysin complexes.marked with FP.1 and FP.2)

This revealed that the dynamin-amphiphysin helices rearrange to form clusters when the GTP is broken down. Further analysis showed that the folded membrane becomes constricted at regions that are not coated with the clusters of dynamin-amphiphysin helices. The researchers also discovered that amphiphysin controls the size of the clusters to help make the new vesicles more uniform.

These new findings will not only help scientists to better understand the process of endocytosis, but will also give new insights into a number of human diseases affecting the nervous system and muscles caused by defected dynamin function.

Reference:

Authors

Tetsuya Takeda, Toshiya Kozai, Huiran Yang, Daiki Ishikuro, Kaho Seyama, Yusuke Kumagai, Tadashi Abe, Hiroshi Yamada, Takayuki Uchihashi, Toshio Ando, and Kohji Takei

Title of original paper

Dynamic clustering of dynamin-amphiphysin helices regulates membrane constriction and fission coupled with GTP hydrolysis.

Journal, volume, pages and year

eLife **7**, e30246 (2018).

Digital Object Identifier (DOI)

10.7554/eLife.30246

Journal website

https://elifesciences.org/articles/30246

Department website

http://www.okayama-u.ac.jp/user/med/biochem/index11.html

Topics

Radio Message from International Students (World Heartful Message)

Okayama University was broadcasted an internet radio program in which international students who have come to study at Okayama University from countries all over the world talked on topics such as their life as international students, what it is like to live in Okayama City, and their research themes. The broadcasts were produced in English or the native languages of the students.

Mr.Islam Md Monirul (left)

Mr.Islam Md Monirul of the Graduate School of Medicine, Dentistry and Pharmaceutical Sciences from Republic of Bangladesh talked about his research and plans for the future.

Further information

https://www.youtube.com/watch?v=vuSafNwld98&list=PLJikPQTwoCj4ggrOUY2cs_AJZIeWdG4t8&t=1s&index=6

Radio Message from International Students
https://www.youtube.com/playlist?list=PLJikPQTwoCj4ggrOUY2cs_AJZIeWdG4t8

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◆Further information

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E-mail: www-adm@adm.okayama-u.ac.jp
Website: http://www.okayama-u.ac.jp/index_e.html

Okayama University e-Bulletin
http://www.okayama-u.ac.jp/user/kouhou/ebulletin/

Okayama University Medical Research Updates (OU-MRU)
http://www.okayama-u.ac.jp/eng/research_highlights/index_id73.html

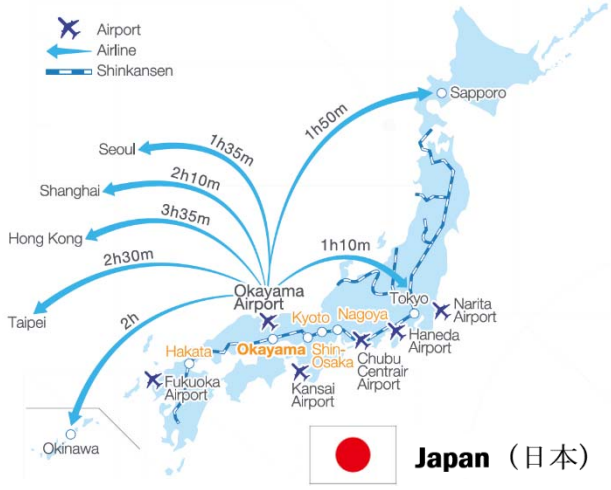
About Okayama University (YouTube 1)
https://www.youtube.com/watch?v=iDL1coqPRYI

Okayama University Image Movie (YouTube 2)
https://www.youtube.com/watch?v=KU3hOIXS5kk

◆About Okayama University

Okayama University is one of the largest comprehensive universities in Japan with roots going back to the Medical Training Place sponsored by the Lord of Okayama and established in 1870. Now with 1,300 faculty and 13,000 students, the University offers courses in specialties ranging from medicine and pharmacy to humanities and physical sciences.
Okayama University is located in the heart of Japan approximately 3 hours west of Tokyo by Shinkansen.

Hirofumi Makino, M.D., Ph.D.
President, Okayama University



SUSTAINABLE DEVELOPMENT GOALS

"Okayama University supports the Sustainable Development Goals"

