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Prime Minister Yoshihiko Noda shares his thoughts on issues of the day on “Prime Minister NODA’s BLOG”: http://nodasblog.kantei.go.jp/

Eminent Japanologist Dr. Donald Keene’s comments on Japan’s capacity to recover following the Great East Japan Earthquake are available on the “recovery in Japan continues” website at http://www.recoveryinjapan.go.jp/eng/
At 4 p.m., after regular classes have finished, students come to the biology room in Kawagoe Girls’ Senior High School in Kawagoe, Saitama Prefecture. Against the background of music in the distance played by students in the mandolin club, they start to feed crickets, observe jellyfish in the water tank and peer at mold fungi using a microscope.

These are students of the SSH class. SSH stands for Super Science High School. The Ministry of Education, Culture, Sports, Science and Technology designated SSH schools with a focus on science, technology and mathematics education with the goal of developing human resources in these areas who can serve as leaders in the future. The SSH system was launched in 2006, and in fiscal 2011, 145 schools across the country were given the SSH designation. These schools pursue a wide range of initiatives. The SSH course set up at Kawagoe Girls’ Senior High School provides more science classes and research hours than the regular course over the
three years of high school. For example, students in the second year of SSH work on experiments and attend lectures on science, instead of art and music that students in the regular course take. Most of the SSH students also take part in research activities after school.

“I’ve been interested in jellyfish since I saw them in the ocean when I was a child,” says Runa Yamamori, a senior in SSH. When I was a junior high school student, I read the book Kurage no fushigi [Mysteries of jellyfish] and I was drawn right into the world of jellyfish… It’s interesting to think that while jellyfish are about 98% water, they move around actively.”

In August 2011 at the SSH student research presentation meeting where SSHs nationwide gather and present results of their research, Yamamori gave a poster presentation titled “Strobilation of moon jellyfish and the impact of thyroxine at each stage,” which was achieved with support of university professors and aquariums, for which she received a poster presentation award.

“I hope to continue my research on jellyfish when I go to university,” Yamamori says. “I want to become a researcher or a jellyfish keeper at an aquarium.”

While about twenty-five students take the SSH course out of about 1,000 students at the high school, many non-SSH students participate in the activities, such as in visiting university research institutes and attending lectures by university researchers invited to the school. In the science school for local elementary and junior high schools, which is carried out annually as part of community contribution activities, more than 100 students participate and present science experiments. About 40% of the students who go to university also choose to study science.

“As we have seen in the problems with nuclear power plants and the environment, science and the public are closely connected in modern society,” says Yasunori Nagamatsu, the high school’s principal. “To prevent people from panicking or taking the wrong action due to scientifically groundless information, I would like students to acquire scientific knowledge. Many alumni will go on to be elementary and junior high school teachers, and developing human resources who cultivate the next generation with scientific knowledge is one of the major objectives of our school education.”
Development of New Biodiesel Synthesis is a four-year project started in 2010 jointly by the University of Kitakyushu, Kitakyushu Foundation for the Advancement of Industry Science and Technology, Kitakyushu International Techno-cooperative Association, and Chulalongkorn University in Thailand. “Full-scale joint development began from FY 2011. The reason we came to harness the resources of SATREPS was because we had been engaged in ongoing basic research under Professor Kaoru Fujimoto (now emeritus professor), who is a developer of this technology and deputy leader of the project, and had been requested to make a new biodiesel by Chulalongkorn University in Thailand, with whom we were already on friendly terms. In Thailand and other parts of Southeast Asia, palm, coconut, and other vegetable oil-producing plants grow in large numbers, so if those abundant plant resources could be utilized as fuel it would be a large step forward for the environment,” says Professor Kenji Asami of the University of Kitakyushu, which heads the joint development.

Biomass energy is a carbon neutral energy that does not increase CO$_2$ in the atmosphere, and international research into biomass energy is currently moving forward in order to reduce CO$_2$ emissions, which contribute to global warming. One form of biomass energy, biodiesel, is made from plant oil, animal oils and fats, and waste edible oil.

The common methods of producing biodiesel are the fatty acid methyl ester synthesis method known as “FAME,” and the hydrocarbon synthesis method known as “BHD.” These two methods of synthesizing biodiesel are, however, problematic.

FAME synthesizes by adding methanol and suchlike to the fats and oils used. This is a common method that allows biodiesel to be produced even in small-scale plants, but glycerin and other industrial waste is generated during production. Also, the synthesized fatty acid methyl ester has a low degree of purity as a fuel, as well as solidifying at 20°C or under. To be used as a fuel, therefore, it must be mixed with 10–15% of diesel oil to prevent it from solidifying.
BHD on the other hand is synthesized by processing fats and oils at high pressure using large quantities of hydrogen. Since the synthesized hydrocarbon has the same components as diesel oil, it can be used as fuel without further processing. However, it requires large-scale facilities, so at the moment can only be synthesized in petroleum refinery plants.

The research being carried out by Professor Asami and his team at SATREPS aims to establish new biodiesel synthesis technology that can be used as 100% fuel in small-scale plants, and to develop it to the stage of practical commercial application within four years.

Professor Asami explains, “With our new method, no secondary ingredient such as methanol is used whatsoever. Simply put, like BHD it synthesizes hydrocarbons using a solid catalyst. For the raw materials, vegetable oil and fat including palm, waste cooking oil, and animal oils and fats generated by meat packing plants as waste products may be used. A certain percentage of hydrocarbons is generated as a by-product, and it is planned to use this as a source of heat for manufacturing plants.”

The new biodiesel synthesis method first coats the surface of the activated carbon and silica with magnesium oxide, creating a solid catalyst in the form of particle sizes of around 1.2 mm. This solid catalyst is packed in a reactor, and heated to 400–430°C while stirring. When the fats and oils that will become the raw material are poured in, a catalytic reaction occurs and the molecules of fats and oils are decomposed, and the vaporized gas is discharged through a pipe to a separate container. This is then cooled, allowing new biodiesel hydrocarbons to be synthesized. With this new method of production, both the plant manufacturing costs and operation costs are quite low. Engine tests using hydrocarbons generated with this method have already been carried out, and it has been demonstrated that combustion occurs without any problem.

The kick-off meeting for this project was held in May 2011 in Thailand. Between August and October seven young researchers from Chulalongkorn University visited the University of Kitakyushu, where each of them spent one month learning experimental techniques. “They already had the basic knowledge, but it was their first time to take part in an experiment, and they were very enthusiastic. Their zeal for research came across loud and clear,” says Professor Asami.

The two research themes for the future are to further increase the capability of the catalyst, and to develop a more efficient reaction method. “Currently, the amount of hydrocarbons that can be synthesized is around 60% of the fats and oils that are the raw materials, but by actively advancing research through international cooperation between the two universities we aim to raise this to 80%, which is close to the ideal figure.”

The project also eyes the possibility of using coconut shell, a natural material, as a candidate for the activated carbon used in the solid catalyst. Looking further ahead, in the future the researchers will also look at whether hydrocarbons can be synthesized by inputting palm or coconut itself directly into a reactor, eliminating the process of converting it into vegetable oil. It is planned to commence the construction of a pilot plant in Thailand in 2012, with a view to establishing the technology for new biodiesel synthesis.

Toshio Matsubara is a freelance writer.
Professor Masahiko Inami of Keio University has invented an “invisibility cloak,” inspired by Japanese animation. The Japan Journal’s Osamu Sawaji reports.

From H.G. Wells’ 1897 novel The Invisible Man to the invisibility cloak in the latest Harry Potter film, the magic of making people invisible has played a role in a great number of novels and films. Surprisingly, Professor Masahiko Inami at the Keio University Graduate School of Media Design invented an invisibility cloak using optical camouflage technology, which was inspired by Ghost in the Shell, a manga (comic book) popular both in Japan and overseas.

“When I was in my doctoral course, the research associate in the lab gave me a book and said ‘If you want to have a discussion with me, read this.’ The book was Ghost in the Shell,” Professor Inami says. “In this manga there’s a technology called optical camouflage that enables people to blend into their surroundings and disappear. At that time I was researching the creation of three-dimensional images by using a projector. I came up with an idea that, though it may not be possible to make objects physically invisible, it may be possible from an engineering aspect to make them visually invisible by blending them into the surrounding scenery through three-dimensional images.”

The optical camouflage invented by Professor Inami is an illusion. To make people invisible, you can make them blend into the scenery by projecting
background scenery hidden behind them on their body. In other words, the scenery behind a person is shot in real time and then three-dimensionally projected onto the body with a projector, just like a movie is played on the screen.

However, in the same way that a movie becomes distorted and does not show up well when it is projected onto an uneven curtain, a person cannot be invisible when the background scenes are merely projected onto the body. And even if the projected portions are made even, images cannot be seen when the surrounding areas are bright.

Retroreflective materials offer a solution for these challenges since they characteristically reflect the light in the same path as it enters. These materials are used for road signs and bicycle reflectors, and they can be seen clearly when light hits them in the day and at night. When using a cloak made of the materials, the projected light (color) does not reflect diffusely, and returns directly to the viewer. This makes it possible to project the background three-dimensional images clearly on the uneven cloak, irrespective of the brightness in the surrounding areas.

Professor Inami’s presentation of his optical camouflaging technology at the 1999 SIGGRAPH (Special Interest Group on Computer Graphics) exhibition in the United States, attracted a great deal of attention. “At SIGGRAPH, I showed optical camouflage as side-show entertainment for the main research results, but a long line formed for the sideshow,” he says, laughing. “One of my favorite comics when I was an elementary school student was Doraemon. I still read this series by Fujiko F. Fujio to get ideas for research. In an intellectual sense, Japanese pop culture became my flesh and blood.”

Optical camouflage is foreseen as being applied in diverse fields such as medicine. Surgery can sometimes become difficult when the afflicted area is hard to see due to the surgeon’s hands and the surgical instruments. Optical camouflage will enable these to disappear from the surgeon’s view. Development of medical technology using optical camouflage is in fact underway at a university in the United States.

Professor Inami also conducted a joint experiment with an automaker in using retroreflective materials for the interior. Using optical camouflage to view surrounding areas from the driver’s seat without anything blocking the field of vision will help to dramatically and significantly reduce the risk of accidents.

“The driver will feel like he’s driving a glass car,” Professor Inami says. “Sir Arthur C. Clarke said ‘Any sufficiently advanced technology is indistinguishable from magic.’ I want to develop technology like magic that general people can use easily in the future.”
A team at the University of Tokyo led by **Professor Michitaka Hirose** is developing a device called MetaCookie+ that “changes” the taste of food being eaten. Toshio Matsubara reports.

MetaCookie+ is a technology that changes the taste of a cookie when it is being eaten based on an illusion evoked by changing its appearance and scent. A team at the University of Tokyo has been developing the technology for the past two years as a virtual reality (VR) research project.

“The project originated with the idea of an undergraduate student of mine who wanted to change the taste of juice with each sip,” says Professor Hirose, who heads the research. “We carried out an experiment in which we changed the color of a sour-sweet drink by illuminating it with a colorful LED light in a glass, and then studied how its taste changes. We found a sensory conflict between sight and taste, and many people perceived a change in the taste of the drink. I thought that if we added the olfactory sense to that, the effect would be further enhanced.”

Here is roughly how the MetaCookie+ system works. First, the user puts on a head-mounted display (HMD) which has a pipe attached that emits smells. The user takes a cookie printed with a marker pattern and holds it in front of a camera built in to the HMD. Then, if the chocolate mode is chosen for example, a computer graphic (CG) image of a chocolate cookie is overlaid onto the cookie through the display. It is programmed so that when the face is
brought closer to the cookie, the CG chocolate cookie too appears larger, so to the user it appears that he or she is holding a chocolate cookie. In addition, a scent is transmitted from the pipe at the end of the nose using a motor. This is set so that the intensity of the scent gets stronger as the cookie gets closer. In this way, a plain, unflavored cookie is perceived as having a chocolate flavor. The device offers the user a total of seven different smells and CG combinations, including cheese and lemon.

In tests, around 80 percent of users of the MetaCookie+ said the taste of their food had changed. Tests have already been carried out in various locations, and when it was shown at the United States computer graphics exhibition SIGGRAPH 2010 (Special Interest Group on Computer Graphics), over 1,000 curious visitors lined up during the three-day event, with 80 percent saying that the taste of their food had changed.

However, this technology does not enable the user to perceive any taste at all. When tests were carried out on Japanese subjects using the smell of the matsutake mushroom, known in Japan for its good scent, the majority of people were not able to identify the taste even when looking at the CG image of a sliced matsutake overlaid on the cookie. This is because matsutake-flavored cookies do not actually exist. In other words, the sensory switch in respect of taste only engages when there is an image already imprinted on the brain, generating an illusion in respect of taste (participants in the tests were not told in advance what the taste was.)

“It is often said that the device could be used for hospital patients who have highly restricted diets, but that is only one example,” says Professor Hirose. “The basis of this research has a profound link with psychology. It could be used in collaborative ventures with the Japanese Society for Medical Virtual Reality, which uses virtual reality in medical treatment, as well as, for example, to enhance the effectiveness of museum exhibits by introducing an olfactory stimulus. I believe that the potential application of this research is not limited to medical treatment alone, but extends to a variety of fields.”

Toshio Matsubara is a freelance writer.
Harnessing the Power of the Sun in Space

The Space Solar Power Systems (SSPS) project is a space-based solar power plant that generates energy by collecting sunlight in geostationary orbit. Researchers in Japan have already moved from the study phase to the technology demonstration phase, aiming for practical use in the 2030s. Toshio Matsubara reports on how Japan is leading the world in this revolutionary technology.

The SSPS currently under development by Japan Aerospace Exploration Agency (JAXA) is a system which collects sunlight from outer space at a space-based power plant floating in geostationary orbit around 36,000 km away from Earth, converts the energy into microwaves or laser beams and transmits these wirelessly to a facility on the ground. JAXA aims to build a solar station that can produce 1 gigawatt (1 million kilowatts) of electricity, which is equivalent to the electricity produced by a nuclear power plant.

Tatsuhito Fujita, associate senior engineer at JAXA, says, “SSPS has numerous advantages over conventional methods of generating electricity. Around 70% of solar energy is lost as it passes through the atmosphere on its way to Earth, but space solar power is a constantly available, stable source of energy, which is unaffected by the time of day, weather or season. Solar energy in space is five to ten times greater per unit area than on the ground. Space solar power is also very environmentally friendly, as the space-based power plant will have zero carbon emissions.”

Currently, researchers are examining two different ways of transmitting energy, aiming to achieve commercial SSPS in the 2030s. The two methods under examination are transmission of power by microwaves and transmission by laser beams. The microwave-based space plant comprises two large mirrors 2–3 kilometers in diameter, solar cell panels, microwave transmitters, and transmission antennas. The electricity produced by the solar cells is converted into microwaves and transmitted to a receiving plant on the ground. The receiving plant consists mainly of an array antenna 2 kilometers in diameter known as a rectifying antenna, where the microwaves are once again converted into
electricity. Microwaves have the major advantage of being able to pass through clouds on their way to Earth. However, the downside is that energy losses occur during the conversion of electricity into microwaves and the conversion of microwaves back into electricity.

Meanwhile, a laser-based solar plant consists of mirrors, a laser module (laser oscillation system) and a transmission system. It converts sunlight directly into laser beams, omitting the process of conversion into electricity, and transmits these to a receiving plant on the ground. The space plant is around 10 kilometers in length. Since sunlight is converted directly into laser beams, energy is not lost as with the microwave-based plant, but unlike microwaves, laser beams cannot pass through clouds easily and the receiving plant on the ground cannot receive the transmitted laser beams if there are clouds in the sky above it. The laser-based plant can also be used to convert laser beams into hydrogen by means of photocatalysts and electrolysis. This hydrogen, which can be used to power fuel cells, can then be stored in the plant.

Since both of these methods have advantages and disadvantages, researchers have yet to decide which of the two to choose. The energy density of both laser beams and microwaves is diffused and dispersed when transmitted to Earth, so even if a bird or plane was exposed to them it would not be harmed in any way. With both systems, the receiving facility on the ground is expected to be located on the ocean.

Fujita says, “There are many challenges to overcome, including establishing an efficient low-cost way of transporting the system into space, unmanned robot technology for assembling the system in outer space, technology for controlling beams, reducing energy losses in power conversion, and producing lightweight parts, but the biggest challenge is how to reduce the overall cost of construction.”

According to Fujita, if the end point is 10, then the current stage of development is around 2 or 3. Following the ground-based experiments to analyze the transmission of microwaves and laser beams currently underway, JAXA plans to start a geostationary demonstration using Kibo, Japan’s experiment module on the International Space Station, and a small satellite in three years from now. This demonstration will include the experimental assembly of a large structure using the International Space Station and higher output transmission experiments and aims to give clear shape to the system concept by around 2020 in preparation for practical use.

Fujita says, “2030 is not so far away. Our roadmap is packed with things that need to be done by then. But I would dearly like to bring this project to fruition because I believe it’s a project of enormous significance.”

Toshio Matsubara is a freelance writer.
Rare metals underpin Japan’s industrial base. In particular, they are considered essential for materials and manufacturing of goods such as automobiles and IT products. Rare metals, as defined by the Mining Industry Council in 1984, are “metals that exist in limited amounts on the Earth and are technologically or economically difficult to extract.” Thirty-one ores are designated as rare metals that are important for Japan to secure a stable supply.

Typical examples of rare metals include dysprosium (Dy) and neodymium (Nd), which are used in the high-performance motors of products such as hybrid vehicles; indium (In), which is needed to manufacture the transparent electrodes in LCD TVs; and cerium (Ce), which is used to polish high-precision glass.

Japan’s Achilles heel when it comes to securing such rare metals is that it is dependent on specific countries for supply of many of its materials. Overdependence on a single country can lead to shortages of materials and high prices if that country decides to impose export limits. For instance, the price of dysprosium increased about twenty-three times and that of cerium about seventeen times in the one and a half years from January 2010 to July 2011.

On assumption of such conditions, in 2006, METI adopted four policies: securing overseas resources, promoting recycling, developing substitute materials, and stockpiling rare metals. The organization charged with achieving the objective of developing alternative materials is the New Energy and Industrial Technology Development Organization (NEDO).

METI and NEDO began their investigations...
in 2005 and launched the Rare Metal Substitute Materials Development Project in 2007. Researchers working on this project select rare metals which might be in short supply in the future and conduct research and development to establish rare metal substitute materials technologies and technologies to reduce rare metal consumption.

NEDO’s Dr. Hiroaki Kurihara, who is involved in the project, explains:

“We first conducted risk investigation and then selected high-risk elements. As a result, we selected ores such as indium, dysprosium, cerium and terbium. We target to finish research to put the results into practical use in five years. We are pursuing the project all the while responding to changes such as an increase in budget and the addition of new ores. For example, the cerium project produced results after about two and a half years. Generally speaking, projects are progressing ahead of schedule.”

As for cerium, the project succeeded in halving consumption of the polishing agent cerium oxide (CeO₂). A porous urethane resin-polishing pad and polishing agent made of cerium oxide are usually used to polish glass for LCD TVs and hard disks. In the project, researchers developed an epoxy resin pad with double the polishing efficiency of a urethane resin pad.

Dr. Kurihara says, “It was thought that because epoxy resin is normally hard, it does not lend itself to use for polishing pads. So our researchers optimized the resin type, its hardness and the amount of air bubbles in it, enabling its use as a polishing pad.”

The research also revealed that zirconia (ZrO₂) and manganese oxide (Mn₂O₃), which have stable supply conditions, can be used as substitute materials for cerium oxide. Thus, rapid progress is being made in research to establish cerium substitute materials technologies and technologies to reduce cerium consumption, and these technologies are expected to be commercialized in 2012.

Dr. Kurihara says, “Currently, research laboratories have succeeded in reducing consumption of indium and dysprosium by 45% and 40%, respectively. Our next challenge is to lead the research results to mass production technology.”

“Establishing rare metal substitute materials technologies and technologies to reduce rare metal consumption is crucial for the future of Japan’s industries. And surely, in terms of securing the stable supply of products, this is beneficial not only for Japan, but also for the entire world.”

Masaki Uno is a freelance writer.
Robots That Care

The International Robot Exhibition 2011, cosponsored by the Japan Robot Association and Nikkan kogyo shimbun, was held at Tokyo Big Sight in Ariake, Tokyo over four days, from November 9 to 12. One of the world’s largest robot fairs, it attracted nearly 100,000 visitors from Japan and abroad. This marked the 19th edition of the exhibition, a biannual event, and featured its largest number of exhibitors ever, with 272 companies and organizations, including robot manufacturers and universities.

Notable exhibits were industrial robots for use in factories, such as in manufacturing food and automobiles, and robots dedicated to nursing and medical care. Meeting the needs of the aging society and birthrate decline was a visible trend. Ai Kitabayashi introduces some of the exhibits.

NSK: Guide Dog Robot

The robot that NSK exhibited is capable of replacing a guide dog. It can go up and down stairs while leading a visually impaired person. The tip of each of its four-wheeled legs is equipped with multiple sensors, which it uses to three dimensionally detect the width and numbers of stairs. It can also detect obstacles on the street and otherwise adequately guide the user. Observers of the demonstration were drawn to the robot’s functions that reflect meticulous consideration for the user’s safety. It temporarily stops just before going up the stairs and again before reaching the landing floor. Each of the legs is equipped with two wheels to ensure greater stability. The wheels are used to move on flat surfaces and the legs for traversing stairs. Users can easily change course by strengthening their grip in the desired direction. Practical use of this robot would reduce problems tied to the time for training required for service dogs. Demand may also grow among potential users who are averse to dogs.

Nippon Dental University Hospital, J. Morita MFG and Kokoro: SIMROID

At a glance, the SIMROID human-shaped patient robot for use in dental clinical training, collaboratively developed by Nippon Dental University Hospital and J. Morita MFG, looks like a person. With a sensor built into the mouth, the robot moans when the scraper contacts the wrong tooth. It can even make an anxious expression and a nausea-like response. Asking it “Are you all right?” will return a verbal response. It also recognizes sound. The monitor displays the amount of burden experienced by the robot, as well as the dentist’s attitude. Development of the robot was aimed at training dentists to have high communication skills and be capable of exercising care for the psychological aspects of patients, along with training in treatment-related technology. Robot manufacturer Kokoro designed the robot’s highly realistic artificial skin, made from strong silicon to enable the mouth to easily be opened wide.
Kyokko Electric: Telexistence FST

Telexistence FST can be operated from a distance, but provides users with the sense they are actually performing the work. The operator wears a head-mounted display showing a three-dimensional image of what the robot sees, and wears a pair of gloves that lets the robot sense even minute movements of the fingertips. The operator’s moves are communicated to the robot via a sensor tube determining the whole body’s movements. In this way, the robot’s arms and fingers move exactly like those of the operator. The same sense is sent to the operator when the robot grasps something. One visitor who experienced the remote operation of the robot reported being impressed by the feeling of being nearly one with the robot.

National Institute of Advanced Industrial Science and Technology: Paro

The seal-shaped Paro was developed for facilitating robot therapy to reduce the effects of dementia and relieve stress. Its body is covered with an antibacterial artificial fur and it acts autonomously using artificial intelligence. It reacts when its name is called, expresses happiness when it is caressed and provides users with a sense of happiness and peacefulness through its communication. The shape and movements of the Paro model those of a baby seal and appear very realistic because of the efforts of developers who traveled to the North Pole to study how seals live. Due to allergies and the possibility of infections, elderly facilities are not allowed to keep animals, so Paro is also highly regarded as a good alternative to animal therapy, both in Japan and abroad. Paro is in fact already in use at elderly facilities in countries such as Japan, Denmark, Italy and Germany.

Fujitsu Laboratories: Baby Bear Social Robot

Fujitsu Laboratories developed a social robot designed to look like a stuffed baby bear, which can be used at facilities for the elderly for mental care and at preschools for emotional education. The robot detects the user’s face via the camera installed in its nose, waves its hands and imitates the user’s movements. Touch sensors are embedded in thirteen parts of the body. Touching these parts makes the bear smile, which can put the user at ease. The robot has three different characters. The cheerful bear is suitable for recreational support, while the calm bear is more suited for acting as a pet in homes. The shy bear turns its eyes away at first, but gradually becomes attached if it is treated kindly. During this bonding process, the shy bear may be able to help the elderly recall their childrearing experience and motivate them to act spontaneously. Fujitsu Laboratories in fact conducted experiments at the home of an elderly dementia patient, and witnessed revitalization of the subject’s autonomic nerves.

Since the bear robot is connected with the Internet, it can also be used to monitor the user. Family members at remote locations can review recorded graphs of the user’s movements and facial expressions.

Ai Kitabayashi is a freelance writer.
In August 2011, the 4th Science and Technology Basic Plan was determined at a meeting of the Cabinet. The Japan Journal’s Osamu Sawaji spoke with Dr. Masuo Aizawa, executive member of the Council for Science and Technology Policy, who was involved with the Plan’s development.

Please tell us the key points of the 4th Science and Technology Basic Plan.

Dr. Masuo Aizawa: The government formulates the Science and Technology Basic Plan every five years for specifically promoting measures concerning Japan’s science and technology in line with the Science and Technology Basic Law that went into force in 1995. The 4th Science and Technology Basic Plan (the “Plan”) was supposed to start in April 2011, but the Great East Japan Earthquake struck in March just before it, so its details were reconsidered.

There are four key points of the Plan that was decided by the Cabinet in August 2011. The first point is utilizing science and technology to achieve recovery and reconstruction from the earthquake. The second is, through promotion of science and technology innovation, resolving issues that Japan and the world face. The third is dramatically strengthening basic research and developing human resources who will play a role in advancing science and technology. And the fourth is promoting science and technology innovation policy by closely cooperating with the citizens. We aim to increase research and development (R&D) investment by both the government and the private sector to 4% of the GDP or more, out of which we will strive to increase the government’s R&D investment to 1% of the GDP. This will bring the government’s total R&D investment to around 25 trillion yen for the next five years.

What sort of science and technology measures will be promoted based on lessons from the Great East Japan Earthquake?

The Great East Japan Earthquake is, so to speak, a challenge from nature. In order to deal with this challenge, we need to comprehensively observe changes in nature on the global scale. To this end, improving the global observation network by satellite both in ocean and terrestrial areas will lead to protection from natural disasters such as earthquakes and tsunamis.

The Great East Japan Earthquake caused great damage to supply chains supporting manufacturing, and agriculture and fisheries, and it is necessary to not only return them to their original state but also reconstruct these industries to be resilient to natural disasters. This includes,
for instance, plant factories capable of high-productivity and stable agricultural production using cutting-edge technologies, and research and development of complete fish culture.

**The Plan includes the promotion of “green innovation.” Specifically, what kind of R&D measures does it contain?**

Green innovation aims at both achieving a low carbon society in response to climate change and securing stable energy supply.

As for key energy supply, for example, R&D measures are needed to further reduce carbon dioxide emissions in thermal power generation and renewable energy must be vigorously promoted in consideration of the future of nuclear power generation.

The Plan also incorporates innovation of a distributed energy system. This targets a dramatic reduction of energy consumption through realization of smart houses and smart communities; that is, where power is generated by technologies such as solar power and fuel cells at the location where the power is consumed, is stored in accumulators, and then used efficiently through energy management, such as through the use of a smart grid.

**Similarly, what types of R&D measures are included in “life innovation” listed in the Plan?**

Research by Japanese scientists has revealed how diseases occur and how the immune system works in the body, and how cells are differentiated. Innovative methods for preventing diseases and developing treatment are being achieved based on the results of this research.

For example, iPS cells, which were discovered by Dr. Shinya Yamanaka, a professor at Kyoto University, are expected to contribute greatly to regenerative medicine and drug discovery. The cell sheets developed by Dr. Teruo Okano, a professor at Tokyo Women’s Medical University, have the potential to fundamentally change conventional treatment. If cell sheets are transplanted into an organ that requires treatment, the transplanted cells will increase and help the organ to recover its functions.

In 2010, the Government launched the Funding Program for World-Leading Innovative R&D on Science and Technology (FIRST Program), and it supports the research of top Japanese scientists.

**How should Japan contribute to the world in the areas of science and technology in the future?**

In 2025, the global population will have increased from the current seven billion people to eight billion. Asia’s population will account for about two-thirds of this. Environmental and energy issues are therefore expected to grow increasingly serious. From this perspective, the Plan includes promotion of the concept of the East Asia Science and Innovation Area, for the purpose of jointly conducting R&D that will help overcome issues common to Japan and Asian countries, and bolster the development of human resources in Asia. Since Japan is experienced with issues such as the environment and aging, and takes the lead in related measures, it should take a leadership role and contribute to other Asian countries so that we are able to rely on each other.
On January 1, 2012, Prime Minister Yoshihiko Noda released his “New Year’s Reflection.”

The prime minister stated, “The year beginning today is the first year in which we set out towards Japan’s rebirth. Seeking to become ‘Japan, a country of hope and pride,’ we must make this a year in which we are able to feel in a tangible way that we have taken a definite step forward.”

He also stated, “The recent extraordinary session of the Diet saw the passage of the third supplementary budget for fiscal 2011, which exceeds 12 trillion yen, and its related legislation, thereby consolidating the system for dynamically pressing forward with reconstruction from the earthquake disaster. At the end of 2011, a ‘state of cold shutdown’ was achieved in the reactors at TEPCO’s Fukushima Daiichi Nuclear Power Station. From now, we will dramatically accelerate the reconstruction from the earthquake disaster and the rebirth of Fukushima, with the Reconstruction Agency, which will be newly established, as the command center.”

The Prime Minister said, “In the era in which the Asia-Pacific region becomes the world’s growth center, it will be essential to make the greatest possible use of the benefits of globalization. Japan will stand at the fore internationally, pursuing various methods in order to realize the concept of the Free Trade Area of the Asia-Pacific (FTAAP).

“Numerous frontiers extending across Japan are waiting for us to take them up as challenges. The issue of ‘women,’ whose strengths in society have yet to be sufficiently exerted. ‘Agriculture,’ ‘renewable energies,’ and ‘medical care,’ all holding the potential to become major growth industries of the 21st century. ‘The sea,’ a treasure-trove of marine resources. ‘Space,’ with its unlimited spatial expansion. By orchestrating the wisdom of industry, government and academia, and transforming these frontiers both at home and abroad from ‘dreams’ into ‘reality,’ I will make these a driving force for Japan’s rebirth.”

The Prime Minister also emphasized, “Rather than fear the ‘risks involved in taking on a challenge,’ we must fear the ‘risks involved in not doing anything.’ Taking on these mounting issues head on, one by one, we will achieve good results. This is also a historic mission to be carried out by the people of Japan, who live in the midst of adversity.”
In October 2011, the Japan Institute of Design Promotion ("JDP") announced 1,112 Good Design Awards for the current fiscal year. For more than fifty years, the Good Design Award has been given to outstanding designs that make people’s lives, industry, and society more affluent. It pays tribute to objects created by people or human activities, including home appliances, automobiles, housing, services, software and regional development.

The Good Design Grand Award, which is presented to the design that most symbolizes 2011 from among all the designs winning the 2011 Good Design Awards, was won by Honda Motor’s information services for a car navigation systems. The service started out as a membership-based information service. It uses data received from the automobiles of members to rapidly provide members with accurate traffic information via a regular car navigation system. After the Great East Japan Earthquake, Honda made this service publicly available, free of charge, over the Internet, allowing people to check on a map which roads were passable. This information was of inestimable help to rescue operations, the transportation of relief supplies and other relief efforts. JDP’s Jun Akimoto says, “The speed with which Honda decided to make this service immediately available to the general public and the way it fulfilled corporate social responsibility at the time of the disaster earned high praise from the judges.”

This year, JDP waived Good Design Award entry fees for businesses headquartered in seven prefectures in the northeast of Japan for the purpose of supporting Japan’s reconstruction in the aftermath of the Great East Japan Earthquake. Among such entries, twenty-seven product and architecture designs won awards, including a traditional magewappa (bent woodwork) bento box, a butter case, a bread dish from Akita Prefecture, and a Nambu ironware pot from Iwate Prefecture.

In June 2011, JDP also established the Design Center for Reconstruction Assistance and launched the Area Aid Design Project. This will provide financial assistance to a total of 100 participating designers and enterprises from the seven prefectures previously mentioned to help them take part in trade fairs worldwide and advertise on the Internet. Products were exhibited in design exhibitions in Taiwan in October and in Hong Kong in November, attracting a great deal of attention from visitors.

Akimoto says, “The exhibition in Hong Kong is expected to lead to a decision to export Sendai tansu clothing chests to Hong Kong. “Even after the Great East Japan Earthquake, Japanese products still seem to be held in high regard.”

Sendai tansu (73.4 cm x 56.3 cm x 37 cm)

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**Topics**

*Magewappa butter case and bread dish*

 highlight:Japan JANUARY 2012
Flavors of the Four Seasons

Traditional Japanese food does not end with sushi and tempura. No matter where you are in the country, from Hokkaido to Okinawa, local food associated with each of the four seasons can be enjoyed. Here we feature some representative local dishes that Japanese people commonly associate with the seasons.

**Spring**

1. **Ikanago no kugini (Hyogo)**
   
   *Ikanago no kugini* is cooked using soy sauce and sugar to stew young *ikanago* (sand lance), a species of fish caught in the Seto Inland Sea from February to March. It is a homemade dish in Hyogo, Osaka and other parts of the Kansai area. Local people feel the coming of spring when eating *kugini*. *Kugi* means “nail” and the dish’s name is said to come from its resemblance to nails.

2. **Hobazushi (Gifu)**

   *Hobazushi* is prepared by wrapping vinegared rice, trout, vegetables and other ingredients in a *honoki* (Japanese big-leaf magnolia) leaf. In the past, households in the mountainous areas of Gifu served hobazushi to neighbors and relatives who helped them plant rice in the spring. The leaf has a pleasing scent and antimicrobial properties.

**Summer**

3. **Katsuonotataki (Kochi)**

   *Katsuonotataki* is made using *katsuo* (bonito) caught off the coast of Kochi in early summer and fall. Since the Edo period (1603–1867), it has been enjoyed as summer cuisine. Rice straw is burned and the fire is used to roast the surface of cleaned *katsuo* before cooling it. The roasted *katsuo* is sliced at about a one-centimeter width. It is eaten dipped in seasoning made of green onion or garlic, and soy sauce or other types of sauce.

4. **Goya chample (Okinawa)**

   *Goya chample* is cooked by stir-frying *goya* (bitter gourd), a typical Okinawan vegetable, with ingredients such as tofu and pork. “Chample” in the Okinawan dialect means “mix.” In the past, *goya* was mainly grown in Okinawa and Kyushu. These days it is grown in family gardens around the country.

5. **Unagi no kabayaki (Shizuoka)**

   *Unagi no kabayaki* is cooked by cleaning an *unagi* (eel), basting it with a mix of soy sauce, sugar, rice wine and other ingredients, and broiling it. The broiled eel can be eaten alone, accompanying other foods or on hot rice.
Japanese customarily eat unagi no kabayaki in the summer to ward off fatigue. Abundant in water, Shizuoka is a common production area of unagi, with numerous farms raising the eels.

**Hiyashiru (Miyazaki)**

Hyiashiru is cooked by dissolving broiled miso in water, adding sliced cucumber, shiso (perilla) and other ingredients, and pouring it on rice. This local cuisine originated from busy farmers’ need for an easy-to-cook food. It can be enjoyed even on a small appetite, a typical symptom brought on by the summer heat.

**Imoni (Yamagata)**

Imoni is cooked using a soy sauce- or miso-based soup to stew taro and meat. Local people in Yamagata typically hold imoni parties in the fall at outdoor locations such as rivers. Imoni is enjoyed accompanied by family, friends, schoolmates and coworkers in the fall when taro is harvested. Every September, the Yamagata City government organizes an annual event for cooking imoni using a pan that is nearly six meters in diameter.

**Harakomeshi (Miyagi)**

Harakomeshi is cooked by adding salmon soup to cooked rice and topping it with salmon and harako (salmon roe). In the fall, salmon travel north in the Abukumagawa river that traverses Miyagi and Fukushima Prefectures. Harakomeshi is said to have become popularized when Masamune Date (1567–1636), a famous military commander who governed this area in the Sengoku and early Edo periods, praised its taste.

**Fugu dishes (Yamaguchi)**

The fugu (blowfish) season peaks in winter, making the fish a typical winter food in Japan. Yamaguchi Prefecture, especially its port city of Shimonoseki, is famous for dishes made with fugu. It can be eaten raw as sashimi, deep-fried as karaage, or thrown in a nabe (hot pot). Also popular is hirezake, sake containing a filet of broiled fugu.

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**Winter**

**Ishikarinabe (Hokkaido)**

Japanese have long had the custom of gathering around a kettle pot to warm themselves in the winter. Ishikarinabe is one of the representative dishes of cold Hokkaido. It originated from a practice of fishermen who lived at the mouth of the Ishikari-gawa river in the eastern part of Hokkaido. In the fall and winter, they would catch running salmon and cook them by cutting them into chunks and stewing them with miso and ingredients such as cabbage, onions and tofu.

**Kiritanpo (Akita)**

Kiritanpo is cooked by grinding cooked rice, molding it to wooden skewers and broiling it. It is said to have originated in the northern part of Akita. Kiritanpo can be eaten pasted with miso, or added to a soy sauce based soup with chicken, green onion, and mushroom.

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**WINTER**

**Fall**

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Eriko Yamaguchi is CEO and designer at Motherhouse, a company she started in 2006, at age twenty-four, to sell bags made in Bangladesh in Japan. The high quality of the bags, clothing, and scarves made by the local people have won over consumers, and in the five years since it was established, Motherhouse has expanded to set up seven stores in Japan and one in Taiwan. In 2008, Yamaguchi, who aims to make a social contribution through her business and to create brands for developing countries, was selected a Young Global Leader by the World Economic Forum, the organizers of the Davos Conference. She has also won acclaim as a young entrepreneur both in Japan and abroad. The Japan Journal’s Osamu Sawaji spoke with Yamaguchi.

How did you have the idea of making bags in Bangladesh?

Eriko Yamaguchi: When I worked in Washington, D.C. in the United States at an international organization assisting developing countries, I started to feel that I had to go and see the reality of developing countries for myself, and when I searched the Internet for “Asia” and “least developed country,” I hit on the name of Bangladesh. After returning to Japan from the United States, I went to Bangladesh and decided to enroll in a graduate school locally. While attending graduate school in Bangladesh, I came across jute through my job at a Japanese trading company. Jute is a natural fiber and Bangladesh and India account for 90% of global exports. Originally it was used to make bags for packing coffee beans. Since it is a durable and eco-friendly material, I thought I could use it to make cute bags with a natural texture to sell in Japan. People in Bangladesh take pride in producing merchandise that matches the needs of developed countries, and not the low-priced, mass-produced items that are the norm for Bangladesh. I thought that creating such a company would be a sound and sustainable way of contributing to Bangladeshi society, and so I established Motherhouse.

What sort of effort goes into producing the high-quality merchandise?

The people working at the Motherhouse factory in Bangladesh earn wages that are twice the average local wage, and the working conditions are top class for the country with pensions, medical insurance and health checks included. However, the most important thing is that, at the factory, anyone can freely voice his or her opinions about the work. At the morning meeting, everyone gathers together in a circle for discussions. Speaking out is also connected to speakers taking responsibility. To produce high-quality merchandise, it is important that...
the employees recognize themselves as the creators of the products.

The craftsman who is responsible for creating samples at the Motherhouse factory has had invitations from several factories saying, “We will pay you more than you earn now if you come here,” but tells me, “I am proud of the work I do for Motherhouse, and I will work here until I die.”

In what ways has local business changed because of Motherhouse?

Since Motherhouse started using jute as a material for fashionable bags, the price of jute has been rising on the domestic market in Bangladesh. Other factories have used jute to make bags like we do. However, hardly any of them have been able to export. One European corporation tried using jute to make bags in Bangladesh, but they were unable to make high-quality products, and in the end, they gave up on the idea. As a material, jute is extremely difficult to handle because it shrinks easily. We went through a process of trial and error, and we made a great number of samples before we finally managed to create products of satisfactory quality.

What has the international reaction been to Motherhouse products?

Half the customers buying the products in Japan are aware of the story of how our products are made, but in Taiwan, most people buy the products because they like the quality and design, and they are not aware of the background. This makes me extremely happy. Naturally, I want people to know that Motherhouse products have crystallized out of the efforts of people in Bangladesh. However, I believe that by its nature, fashion should make people happy. That is why I don’t want to sell by pushing the story behind the products on customers.

In my opinion, the ideal would be if people who buy our products noticed that it says Made in Bangladesh, and that they learn the story by reading our website.

Please tell us about the future of Motherhouse.

We would like to open another five or six stores in Taiwan in the next year or two. After that, we plan to open stores in Hong Kong. In the future, we would, of course, like to open stores in Paris and New York. That’s a big dream for me! I believe there will be a day when we rub shoulders with Furla, Prada and Louis Vuitton. With this in mind, we moved the factory from the capital city, Dhaka, to the suburbs in November 2011. We plan to double the size of the factory and also to increase the number of employees from about 40 people to 100 people. We have imported state-of-the-art machinery from Italy for the factory. We would like to produce a higher grade of product by mixing the precision these machines are capable of with the warmth of handcrafted products.
“It all stemmed from a genuine fondness for alcohol. Until I came to Japan [1988] I couldn't speak a word of Japanese and had never even tried sake,” says Harper, who in 2007 was appointed as the toji at Kinoshita Brewery, a sake brewery in the city of Kyotango, situated along the Sea of Japan side of Kyoto Prefecture.

It is the toji who manages the sake brewery workers known as kurabito, and takes full responsibility for every aspect of the brewing. In the past, toji were farm workers who would brew sake to make a living during the agricultural off-season. Requests would be received from brewing company owners, and with kurabito (the majority of whom were farm workers themselves) in tow, the toji would live at the brewery from autumn to spring, during which time they would fully immerse themselves in the brewing of sake. The work was done on the basis of annual freelance contracts, and it was common for toji to switch between multiple sake breweries depending on their compatibility with an owner, the terms offered and so on. As the flavor of sake requested by an owner and the equipment available differed depending on the brewery, toji would hone a unique set of skills through a process of trial and error at each new brewery.

The early 1990s, when Harper started learning the craft of sake brewing as a kurabito, was the end of the era of the traditional toji system. Thereafter, sake brewing was also swept up in the wave of “rationalization,” and the family of brewery owners or its directors came to assume the role of toji. While these measures were adopted to provide stability for companies’ organizational structures, it also came with a downside. Since these breweries only knew about their own techniques, they came to hold a narrower view of sake brewing. Although Harper was among the last generation to train under the tutelage of old toji, “that [heritage] is my most valuable asset,” he says.

For Harper, who passed a screening test to qualify as a toji in 2001, Kinoshita Brewery was the second brewery he had worked at as toji. The first thing Harper set out to do at Kinoshita Brewery was to utilize a traditional sake brewing technique he calls shizen-shikomi, or “natural preparation.”

Since the Meiji period (1868–1912), sake has been brewed by adding lactic acid that inhibits the propagation of bacteria during the shikomi process, and by then adding pure yeast cultures. This is because doing so eliminates inconsistencies in quality and enhances the efficiency of the fermentation process. In the tra-
ditional method called *kimoto*, lactic acid is not added, but almost all contemporary brewers in that style do add pure yeast cultures. Harper’s shizen-shikomi is the extremely rare pre-modern method where only rice, *koji* mold and water are used as the raw ingredients and no lactic acid or cultured yeast whatsoever is added. While the fermentation process is left to natural yeast which has been established for hundreds of years at the brewery, control of the process requires meticulous care.

“It’s not that I’m particularly fixated on the natural preparation process; it’s more that I just need to make various types of sake,” explains Harper. “That’s why in addition to the regular techniques I had to try out techniques employed during the Edo period (1603–1867) which are no longer used today. Whatever the technique, in each process there is an immense number of very specific requirements that leave no room for compromise.”

Sake made by Harper in his first year at Kinoshita Brewery went on to win gold in the National New Sake Awards, catapulting the sake into the limelight. Its magnificently pure flavor earned it the highest of praise.

Before Harper came, almost 100% of Kinoshita-Shuzou’s product was being shipped to nearby areas, but over the last five years production has more than doubled and the brewery has undergone rapid growth with shipments of sake not only throughout Japan but also to export markets such as the United States, England and Hong Kong.

“While the quality of the grapes is said to determine 80% of the finish of a wine, for sake, the quality of the rice used only determines the outcome by 20% at most. Truly complex processes are required, and microbes must transform the rice into something completely different [rice koji] before fermentation can even begin. To that end, ‘calm’ is an essential quality for staff, and in no way am I speaking in an abstract sense. Without fail, the sake produced by a brewery with strained interpersonal relations will taste bad.”

Sake brewing is infinitely close to agriculture, says Harper. Things don’t work at the pace set by humans. The brewers work as a team to tailor their efforts to the workings of nature, employing the best possible methods while giving meticulous thought to the state of the microbes at all times. Harper says he learned what the most important aspects of sake brewing were through the traditional toji system. During the seven-month period from the start of sake brewing in October through to April, Harper doesn’t take a single day off. Even during the off-season, Harper is tireless as he holds lectures in Japan and overseas to communicate the appeal of sake.

“I’ve had several invitations from overseas to go and work as a chief sake brewer, but in the end I want to produce sake here in Japan where the tradition is. It might be physically and mentally draining, but it is a truly rewarding job.”

*Philip Harper checks the *koji* mold at Kinoshita Brewery.*

Toshio Matsubara is a freelance writer.
When Masaki Sato, fourth-generation president of yarn specialist Sato Seni, set about creating a fashion brand to go with the company’s traditional business, he decided to launch it in New York even before making it available at home in Japan. The global visions for M.&KYOKO—founded by and named after Sato and his wife—were clear for a company that began life in the countryside of northeast Japan at the beginning of the twentieth century.

“Our aim was to create a contemporary Japanese brand that doesn’t follow European fashion but has its own identity. What makes our company different to many other fashion brands is that we not only design the clothes but also make everything from the yarn to the finished product, as well as do the promotion, in-house,” explains Sato, who graduated from Tokyo’s famously demanding Bunka Fashion College, the alma mater of many of Japan’s top designers.

The origins of the company date back to Sato’s great-grandfather, who founded it to create an alternative industry in rural Yamagata Prefecture for the long snow-bound winter months when working the land was impossible. Sato Seni span silk for kimonos in its early years, but as Western clothing became the norm in Japan, the company shifted to making woolen yarn.

Although influenced by European styles of knit and yarn, the company continued to innovate and develop its own distinctive varieties of fibers. Much of this innovation relied on making adjustments to old spinning machines to create threads such as ultra-fine mohair that were believed to be impossible to achieve by others in the industry.

“Since I took over about ten years ago, I’ve worked on creating unique yarns and variations that don’t exist anywhere else,” explains Sato.
“When new machines are developed for our industry, the aim is on efficiency and lowering costs, rather than improving the quality and craftsmanship,” says Sato, pointing out that his company has a different focus.

With the company’s clothes still made at its factory in Sagae City, Yamagata Prefecture, Sato Seni realized that it couldn’t compete on price with cheaper imported yarn and decided to focus on high-end materials created with an emphasis on monozukuri Japanese-style craftsmanship. Sato Seni also uses specialist craftspersons in Niigata, Nagoya and Osaka to create particular textiles. These fibers are used by high fashion labels around the world, including Nina Ricci for the mohair cardigan that Michelle Obama wore for her husband’s historic inauguration ceremony as president of the United States.

In order to source the best raw materials for the company’s products, Sato makes annual pilgrimages around the globe to farms as far afield as South Africa, New Zealand, Australia, South America, Mongolia and China.

“Different wools have different qualities, just like the hair of the different races of human beings,” says Sato, who describes himself as a wool otaku, or nerd.

Sato believes that many of the company’s customers share his almost cultish passion for the attention to every detail that defines its products.

“Maybe only one in a hundred people are interested in our clothes, but those that do like them, really love them. That’s fine with us,” says Sato.

M.&KYOKO now has eight specialist shops in Japan and also sells the brand in Europe and Asia. Sato Seni has also launched other ranges including Masaki Kyoko, a knit accessories brand; m. by M.&KYOKO, a diffusion brand of M.&KYOKO and FUGA FUGA, a daily ladies knitwear brand.

Sato Seni now has six brands under its umbrella and its president and creative director says his dream is to launch more by collaborating with young designers who will have the chance to create their own ranges while controlling the entire process from start to finish.

“The single most important thing is to pass on the techniques and craftsmanship to the next generation,” says Sato.

Gavin Blair is a freelance journalist living in Tokyo who writes for publications in the United Kingdom, United States and Asia.
As one of the closest communities to mainland Asia, the city of Fukuoka has long considered itself to be the gateway between Japan and the rest of the continent. Opened in October 2005 as Japan’s fourth national museum, after those in Tokyo, Kyoto and Nara, the Kyushu National Museum has taken that theme and bases its activities on the concept of interpreting the formation of Japanese culture through the perspective of broader Asian history.

And while its exhibits look back through the centuries, the museum’s remarkable five-storey building is thoroughly modern and uses all the latest technologies to protect the items with which it has been entrusted.

“This area is very important for the understanding of all Japanese history because we have so many archeological sites,” says Yoshihiko Akashi, an archeologist and director of the museum’s Exhibition Division.

Standing above a large aerial photograph that encompasses Dazaifu, the city of Fukuoka to the north and the broad sweep of Hakata Bay beyond, Akashi points out key sites that date back as much as 1,350 years and can still be clearly seen to this day. They include the mizuki, or water fortress, a wall-and-moat defensive feature that was 14 meters high and 1.2 km long constructed across the valley below the key town of Dazaifu in 664.

The museum’s main exhibition hall displays some 800 items of cultural and historical importance, with every single piece a genuine work, Akashi says.

“These are not only items that tell us about Japanese history, or that of the Kyushu region, but they are the history of Asian cultural exchanges,” Akashi continues. “We want to explore the way in which Japanese culture has created its own uniqueness, in part by amassing and digesting foreign cultures.”

The entrance to the museum is an impressive atrium-like hall with an elegantly curved roof. As well as an auditorium, the first floor includes Ajippa Square—which takes its name from Ajia-noharappa, meaning Asian fields, where children and adults alike are encouraged to handle everyday items from across east Asia, from Malaysian puppets to Okinawan musical instruments, Indonesian face masks, kites from the Himalayan kingdoms and national costumes.

The fourth floor is given over to the Main Exhibi-
tion Hall and takes as its theme “Ocean Ways, Asian Paths” for the five sections. The hall is ingeniously designed to enable the curators to move and change the exhibits at regular intervals, while the subtle lighting shows off the items to their full glory.

Visitors are initially taken into the prehistoric Jomon period (13,000 BCE–300 BCE) and are treated to a video depicting the lives of the first hunter-gatherers who inhabited what is modern-day Kyushu. It also shows the devastating eruption of Mount Aso 90,000 years ago, a blast that left much of Kyushu covered in several meters of debris from the volcano.

In nearby display cases, 35,000-year-old cutting tools are made of stones that were originally from the Korean peninsula, Siberia and other parts of mainland Asia, indicating just how far back this region’s trading ties extend.

The next section is devoted to the arrival of rice-growing culture and includes remarkably well-preserved wooden tools from the Yayoi period (300 BCE–300 CE). There is also a recreation of the large jar used for royal burials in the Yayoi period, complete with mirrors imported from China and a spear, based on the first-century tomb excavated at Ito-shima, Fukuoka Prefecture.

The third section of the museum examines the age of the envoys, when trade and political ties were forged with dynasties on mainland Asia, including along the length of the Silk Road, which brought metalwork items and glass from the Middle East.

The exhibits include part of a Mongol ship that was part of the invasion fleet destroyed by the “divine wind” in 1281, a fourteenth-century sword by master-swordsman Rai Kunimitsu and a horde of 100,000 copper coins that were found buried in a large earthenware jar and whose owner had never returned to collect them.

Julian Ryall is the Japan correspondent for the Daily Telegraph and freelances for publications around the world.

**Access and Admission**

**Address:** The Kyushu National Museum 4-7-2 Ishizaka, Dazaifu City, Fukuoka

**Tel/Fax:** +81 (0)92 918 2807/+81 (0)92 918 2810.

**Website:** www.kyuhaku.jp

**Opening Hours:** 9:30 a.m. to 5 p.m. (last admission at 4:30 p.m.). Closed on Mondays and New Year Holidays. If a Monday is a national holiday, the museum will be closed the following day.

**Tickets:** 420 yen for adults and 130 yen for college students. Free for children below the age of seventeen and those aged seventy or older.

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**Important Cultural Properties on display at the Kyushu National Museum**

1. **Buddhist scriptures box with peacock design gold lacquerwork,** from Yuan-Dynasty China (1315). Chinese lacquerwork became popular in Japan from around this point on, in the Muromachi period (1336–1573).

2. **Yutekitenmoku bowl** from Kenyo, southern China, thirteenth century. Yutekitenmoku ware takes its name from the patterns which look like scattered oil on the surface. This piece, measuring 12.6 cm across and 7 cm tall, is a particularly beautiful example.

3. **Bronze Buddhist statue,** from North Wei-Dynasty China (443). Standing 53.5 cm tall, the figure has a strong muscular body and curly hair, indicating influence from the west.
Kite-flying has been a popular pastime among ordinary folk in Japan since the Edo period (1603–1867). The kites are simply constructed, paper or more recently plastic being stretched over a bamboo frame and decorated with pictures of such things as warriors or dragons. The tradition of kite-making continues today, with the New Year’s holiday being a favorite time to fly these colorful creations.