

# sustainable japan

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## Meat on Mars? Sky's the limit for cellular food frontier

### Roundtable

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By the year 2040, Yuki Hanyu, the CEO of IntegriCulture Inc., aims to build a factory on Mars.

Leveraging his background in nanotechnology (Ph.D., Oxford University, 2010) and his work on the development of low-cost "cellular agriculture" technology, he wants to contribute to sustainability by industrializing the growing of meat from cell cultures — a process that doesn't require herds of cattle. This technology could be a solution not only for the dietary demands of Earth's growing middle class, but even for the space colonists of the future.

Beyond its own research and development, IntegriCulture offers a technological platform for other businesses — primarily within the agriculture and cosmetics industries — to use for their own cell-culture initiatives.

Hanyu was the guest at The Japan Times Sustainable Roundtable No. 28, hosted by Ross Rowbury, on Feb. 27.



Yuki Hanyu, co-founder and CEO of IntegriCulture Inc. COSUFI FOR PHOTOMATE

### Science fiction, or science?

Growing up, Hanyu was fascinated by science fiction as depicted in Japanese anime such as "Gundam" and "Ghost in the Shell." Early on, he was interested in battery technology to enable futuristic societies running on 100% renewables, "but battery technology is already a reality, and I wanted to work on something even more sci-fi-ish," he explained.

In space operas, things like cell-cultured meat are often depicted as the means by which humans in outer space derive their sustenance. "I want to make the really cool things I saw in anime and video games a reality, and cell-cultured meat seems the place to be right now," Hanyu said, emphasizing the word "cool." He added that he believes there is something within us that cries out for these technologies to be real, and that we actually need them. This, he said, is why they appear repeatedly within science fiction media.

One question on consumers' minds when it comes to something like cell-cultured meat is, "Does it taste and look the same as real meat?" Hanyu said that depends on how it is made. Because the product would be identical at the cellular level, it should theoretically taste the same. However, according to Hanyu, there are many adjustments that can be made, and cell-cultured meat can take on various characteristics. "Theoretically, you can make meat that is higher in protein, or even set the appearance of the marbling to look like 'Pikachu!'" he exclaimed.

### Making meat sustainable

What cell-culture technology companies like IntegriCulture do is grow cells that become the basis for agricultural and cosmetic products. Within cosmetics, IntegriCulture has a serum currently available at some skin care clinics, called Cellament, that contains bioactive ingredients. "It takes at least two weeks to make only a small amount," said Hanyu.

Switching to agricultural products, Rowbury wondered how long it would take to



Roundtable host Ross Rowbury and Hanyu get ready for another chat. COSUFI

make a kilogram of meat. "That depends on the process," explained Hanyu. "Cells divide every day or two, so if you already had 300 tons of cell-cultured meat prepared in a big tank, you would have another 300 tons the next day. In that scenario, creating 1 kilogram would be a question of minutes." In the long run, if the project continues without major engineering obstacles, they should be able to create a lot of meat in a very short time indeed.

The technology can also be used for poultry or even fruits and vegetables. "It's basically like growing a peach without a peach tree," Hanyu said with a laugh. Of course, to create cell cultures in the first place, live cells need to be acquired from an animal or plant. The cells then need to be given the proper nutrients (cell medium) and environment

in which to grow, but once the process starts, cell division takes care of the rest. At the end of this process, you are left with a slurry of cells that can be formed into more aesthetically pleasing forms in a process known as tissue engineering. "To be honest, tissue engineering technology is not there yet, but it is being actively researched for not only cellular agriculture, but also regenerative medicine."

How does cellular-based agriculture contribute to sustainability? Increasingly, new companies and technologies have been forced to grapple with the reality of climate change and the ecological footprint that their products and consumers leave behind. The conversation is especially important to have when a product is brought to market on a large scale. As the globe's population increases, and especially as people in devel-

oping countries acquire more wealth, the demand for protein-laden diets is expanding. "In some countries," Hanyu said, "demand for meat-based calories is likely to increase by as much as 30% over the next two decades." This in turn will create demand for ever more land to raise cattle, taking a heavy toll on the environment. In the future, Hanyu expects that the process of producing cell-cultured meat will require far fewer resources than traditional cattle farming.

### 'Neophobia' and challenges

"The vast majority of people don't like change," Rowbury observed. When introduced for the first time, new technologies and products often produce backlash, sometimes called "neophobia." Genetically modified foods, insect-based diets and plant-based meat replacements are all examples of developments in the food industry that have not been enthusiastically embraced everywhere.

Rowbury pointed out that one of the most important elements of getting the public's acquiescence to change is increasing people's familiarity through effective public relations. For cellular agriculture, Hanyu explained that there are many ideological connections that people might have with it already, including being driven by concern for animal welfare, sustainability or protecting the environment. Hanyu insisted that the transition toward building sustainable food supply chains has been hastened due to increased public awareness surrounding environmental issues like these.

Going forward, the industry will be faced with many challenges. Other than public perception, companies like IntegriCulture will need to comply with the food industry's strict regulatory landscape as it relates to public health. This becomes more and more important the more the company scales up.

As for scaling, "The science and theoretical possibilities are already a reality, but the engineering to scale the process isn't quite ready yet," explained Hanyu. It is only a matter of time before it is ready, though, and he sees



Hanyu graduated from the University of Oxford with a Ph.D. in chemistry. COSUFI

no fundamental flaws with further development. One thing that is needed are large bioreactors, each of which could hold around 200 liters of cell medium at a time.

In the wake of the food supply chain crisis wrought by the conflict in Ukraine as well as the recent inflation in food prices, countries like Japan are increasingly focusing their gaze on food security. "A lot of conflicts boil down to scarcity of food and energy," Hanyu said. Cellular agriculture is a technology that could, if the challenges are overcome, become a scientific remedy to many economic ills and could completely change the dynamics of global society. "I think we are very close to a post-scarcity society," Hanyu said, "which means we end up with a new problem: How do we effectively distribute abundance?"

"I'm reminded of 'Star Trek,' where they have a machine called a replicator that just creates food for you, so when that happens, food is no longer scarce," Rowbury commented. "It's absolutely fascinating to me to witness what was once science fiction becoming reality."

IntegriCulture  
Roundtable is a monthly series of English-language events organized by The Japan Times Cube. For more information visit <https://sustainable.japantimes.com/roundtable>



## Dewaya

Pure flavors of local northern cooking



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The town of Nishikawa, home to the Dewaya restaurant and inn, is about 40 minutes by car from Yamagata Station. Nestled in the foothills of the famous Mount Gassan, the town receives a lot of snow even for Japan's snowy northern region. Sericulture, forestry and mining once thrived in the area but have since declined, now replaced by the tourism industry, which centers on summer hiking, spring skiing and hot springs.

Dewaya was established in 1918 as an inn. Haruki Sato is the fourth generation to carry on the family business, learning his trade at a high-end Japanese restaurant in Tokyo before returning home to Nishikawa in 2013.

"The first thing I did was build connections with traditional hunters, skilled foragers of wild vegetables and other local food producers. That strengthened my commitment to making the natural abundance of Mount Gassan and wild vegetable dishes the focus of the restaurant," he said.

Accommodation and two meals starts at ¥19,800 (\$150) per night. Restaurant service alone is available starting at ¥6,600 for either lunch or dinner. The "chef's table"

package, including one night's accommodation and two meals prepared personally by Sato, is also available. This latter option is of course popular with foodies.

Unlike coastal Yamagata cities such as Sakata, Nishikawa was an impoverished mountain area until the bubble years of the 1980s. The food prepared at Dewaya

draws on the knowledge of earlier generations who lived through hard times. These are the pure flavors of local cooking, distinct from the Kyoto-style cuisine that became popular throughout Japan following World War II. It is Sato's enduring aim to share this "flavor of the mountains" with the wider world.

MIKYO YOSHIMURA  
YAMAGATA PREFECTURE GOVERNOR



We are delighted that Dewaya was selected for The Japan Times' Destination Restaurants 2022. In Yamagata Prefecture, the

culture of enjoying the gifts of the mountainous land in various ways is still prevalent, and Dewaya's wild vegetable dishes bring out this charm to the fullest. Yamagata Prefecture is surrounded by beautiful mountains and blessed with beautiful nature, with the Mogami River flowing through it. A variety of delicious seasonal ingredients can be found all over the prefecture, so we hope you come visit Yamagata Prefecture.

DAISHI KANNO  
MAYOR OF NISHIKAWA



Dewaya is located in the center of Yamagata Prefecture. At Dewaya you can enjoy original cuisine that creates a unique harmony using local ingredients.

Gassan Shizu Onsen in the town of Nishikawa has the highest amount of snowfall in Japan, exceeding 6 meters. Its underground water has been selected as one of Japan's top 100 waters. We hope you will come to Nishikawa and enjoy mountain climbing, summer skiing, saunas, and feast on chef Haruki Sato's cuisine, which uses plenty of ingredients from the mountains.

## Nomura Research Institute takes initiative on co-creating the future

### ESG/SDGs

HIROKO NAKATA  
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Nomura Research Institute has a unique background. Japan's first private think tank was founded as a joint-stock company, unlike many others overseas. In addition, it explicitly set a goal of contributing to society in its founding prospectus decades ago.

It was established in 1965 when a research section of Nomura Securities Co. was spun off. The credo in the NRI founding prospectus says its purpose is to promote industry and be of service to society as well.

"Since NRI was founded, we have cherished our corporate identity to conduct sustainable management," President and CEO Shingo Konomoto said in a recent interview. Because of its corporate background, the company has tried to strike a balance between its social and economic priorities. Konomoto said NRI tended to prioritize social values for long time until it was listed on the Tokyo Stock Exchange in 2001, which prompted the company to place more emphasis on profitability.

NRI once again highlighted the importance of its social values in the 2019-2022 medium-term management plan by defining its nonfinancial values, he said. The plan shows that NRI's three social values are "Co-create a thriving future society by driving new value," "Co-create an ideal society by effectively utilizing its resources" and "Co-create a safe and secure society by advancing its infrastructure."

"The definition of the values helps us to think which social values our business activities are creating and what kind of new business opportunities we can explore," the president said. The three social values listed on the midterm plan led to establishment of what NRI calls "digital social capital" — social infrastructure constructed by its consulting and information technology services. For example, in 2021, construction machinery maker Komatsu Ltd., telecommunication firm NTT Docomo Inc., Sony Semiconductor

Solutions Corp. and NRI jointly launched a new company, Earthbrain Ltd., to support digital transformation in the construction industry and improve productivity and performance at construction sites.

Using the technologies of artificial intelligence and virtual "digital twins," Earthbrain's service enables builders to make optimum construction plans in virtual reality, finding the most efficient workforce and the amount of materials based on the geographic conditions. NRI provided the digital platform. By introducing the service, the amount of time needed to set up a plan can be cut from several months to just one day. Amid the country's aging population and shrinking labor force, the service improves productivity in civil engineering and slashes costs. "Such examples of creating social values through digital social capital inspire workers to make new proposals to our customers. I think this is beginning to create our next business opportunities," Konomoto said.

Another example is its business connected to My Number personal identification cards, which have embedded IC chips. In December, Nippon Life Insurance Co. started to use an identity confirmation system provided by NRI to check whether the owner of a card has died. If so, the life insurer prompts the bereaved family to request policy payment.

NRI is also known for its active disclosure of financial and nonfinancial information related to environmental, social and governance (ESG) issues. "I believe we cannot deceive financial markets," Konomoto said. "Even if companies want to hide something from them, that would be impossible." Disclosing necessary information for investors and other stakeholders leads to commitment by companies. It also sends a good message to employees, he said. "We want to keep the level of our disclosure at the top level." Konomoto said such a stance wins a company a high reputation from institutional investors who have a long-term perspective with an emphasis on impact investment.

NRI not only conducts sustainable business management for itself but also supports



Shingo Konomoto COSUFI

sustainability efforts by its customer companies. With its NRI-CTS (NRI-Carbon Tracing System) service, the company estimates the amount of greenhouse gas a customer company emits, both itself and in its supply chain.

As for taking a broad perspective on the future, Konomoto said NRI aims to play the role of a coordinator that creates a blueprint for a future society and starts businesses to realize it while reconciling the interests of various stakeholders.

One example is the GX League for green transformation, whose grand design was announced by the Ministry of Economy, Trade and Industry last year, aiming to open discussions for rulemaking to launch emissions trading by 2026. In fiscal year 2022, nearly 700 companies based in Japan have agreed to join the league. NRI is one of the organizers for making rules and conducting trials over the next three years.

"Since social issues are becoming more and more complex, we cannot easily solve them alone. There are an increasing number of problems that we should solve by forming a team with various stakeholders," Konomoto said. "I want NRI to play the role of taking the initiative in doing this."

NRI is a member of the Sustainable Japan Network, a group of companies that cooperate with this newspaper in spreading information about sustainability. You can also be part of the network; scan the QR code for details.



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