

# FINDING CLUES IN THE NATURAL WORLD

A conversation with **JIRO KISHIMOTO**, head of Nagase Viita's Research, Technology & Value Creation Division



Using its unique enzyme technology, Japanese R&D company, Hayashibara, has been manufacturing carbohydrates from natural products for 140 years. To reflect its ongoing commitment to sustainability, the company recently changed its name to Nagase Viita. Jiro Kishimoto, hair biologist and head of the Personal Healthcare Division, describes the repositioning of the company to put sustainability at its core.

**Why is the company changing its name now after Hayashibara has been part of Nagase Group for 12 years?**

Last year, we merged with Nagase Group's enzyme business division including R&D and its manufacturing facility, which was focused on the fermentation of enzymes derived from *Streptomyces* bacteria, which are mainly used for flavouring foods. The name for this combined company, Nagase Viita, embodies the idea that, through co-creation with our stakeholders, we intend to enhance the value of our biotechnologies and materials, and thereby contribute to the well-being of people and the planet.

**Will there be changes to how the R&D division operates?**

We are an R&D-oriented company. We do everything ourselves, from invention, identifying and characterization of enzymes through to manufacturing — that's what attracted me to join the company a few years ago. I think the change now will be towards a broader focus. Because we had such success in the 1990s with our signature product, the carbohydrate trehalose, we didn't focus as much on our others. Now, we want to keep using our strengths in starches and manufacturing,

but also to expand to other technologies and fields to make something new — perhaps an environmentally friendly, sugar-based biomaterial, for example.

**Could Nagase's streptomyces technology be integrated with Nagase Viita's carbohydrate manufacturing?**

*Streptomyces* are famous for producing antibiotics, but they have also been used to safely produce food enzymes for many years. These bacteria have many advantages, such as cloning technology that can improve their yield efficiency. Now that we're one team under Nagase Viita, we have high hopes that, by combining these two enzyme technologies, we will be able to develop unprecedented naturally derived materials.

**What is Nagase Viita's most famous advance?**

The efficient production process of trehalose — a carbohydrate that was conventionally extracted from yeast at very low yields. We used our enzyme technology to produce trehalose from starch at high yields on a commercial scale. This breakthrough made trehalose a viable additive for the food industry.

**Can you use trehalose to develop new biomaterials?**

Yes, we're working on using trehalose as a biostimulant

for agricultural applications. Normally, pesticides and chemical fertilizers are used to improve crop yields. But biostimulants are a new concept — by harnessing plants' inherent resilience to environmental stress, they offer a safer way to stimulate plants to grow more vigorously. Because trehalose is well known to induce the native defence mechanisms of plants against drought or pests, we're eager to see how it can help reduce damage to plants caused by severe climate.

**Another success story is glucosyl hesperidin. Can you tell us about it?**

Hesperidin is a flavonoid found in the peels and membranes of citrus fruit, but applications were hampered by its poor solubility. We found that solubility increased remarkably by using an enzyme to add glucose to form alpha glucosyl hesperidin, making it viable both for consumption as a food ingredient and for topical application as part of personal-care products.

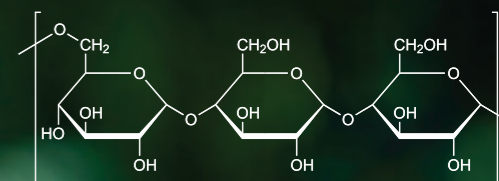
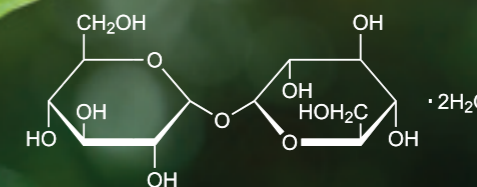
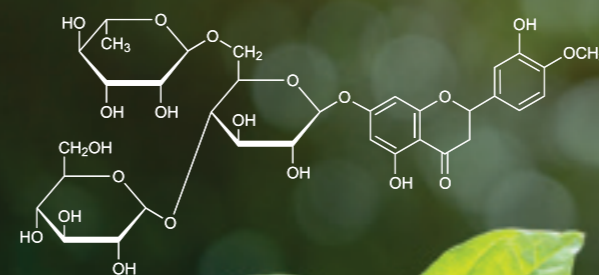
Interestingly, in a collaboration with Yosuke Nakazawa of Keio University, we've been conducting early-stage laboratory research on the application of alpha glucosyl hesperidin to treat presbyopia<sup>1</sup>. Presbyopia is an eye disease in which the lens hardens,

resulting in an inability to focus on close objects.

**Hayashibara has a history of sustainable manufacturing. What are some future challenges in this area that Nagase Viita will tackle?**

With our history of developing unique materials of natural origin, sustainability has always been at the core of our business, even more so now. We aim to develop new sustainable materials derived from natural products and to make our existing materials more sustainable. For example, pullulan, a polysaccharide developed by Hayashibara 50 years ago, has recently found renewed popularity for use in capsules for supplements and pharmaceutical applications due to its film-forming ability and oxygen-barrier function. As a company based in Okayama, known as the "Land of Sunshine" in western Japan, a region rich in nature overlooking the Setouchi islands, Nagase Viita aims to make further leaps by innovating in enzymes and carbohydrate production to develop surprising and sustainable biomaterials.

1. Nakazawa, Y. et al., *Biochem. Biophys. Rep.* **25**, 100885 (2020).



## WHERE NATURE AND GLYCOSCIENCE THRIVE

Nagase Viita leverages expertise in glycoscience and enzymes to create new values from nature for a healthier planet. Our unique R&D extends into diverse areas of medical science and agriculture leading us towards new discoveries and beyond.

