

# Enzyme Wave

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## The usuzumi-zakura cherry tree

In 1922, five historic cherry trees from across Japan were designated as "national natural treasures".

One of them can be found in Motosu City, not too far from the Amano Enzyme Yoro Plant in Gifu Prefecture, central Japan, and is over fifteen-hundred years old. Standing 16.3m tall, with branches spanning 26.9m in width, it is a magnificent sight.

Known as the "usuzumi-zakura", which means "light grey cherry blossom", the tree's name derives from the fact that it undergoes a gradual change in colour; the pale pink buds change to white flowers, and then the petals turn to light grey just before they fall.

In the past, the tree nearly died after suffering severe damage from heavy snow fall and typhoons, but it made a full recovery thanks to the devoted care of an arborist and members of the local community. As a result, usuzumi-zakura continues to give pleasure to the many visitors who come to see it every April.



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■ Adding new value to food

The oldest and most familiar product utilizing enzymes is food.

Food has long been appreciated for its deliciousness and nutritional benefits. However, in recent times the physiological function of food has been gaining more attention as evidence of its link with lifestyle diseases accumulates. Preventative medicine is looking with rising anticipation toward the physiological function of food as a means to curtail the onset of lifestyle diseases and reduce the rising healthcare costs of a rapidly aging society.

The change in our perception of food is having a great effect on the food industry. Some estimate the food industry can create a global market potentially worth 100 billion dollars by commercializing food products with the physiological function for maintaining health.

Therefore, research on the physiological functional food is an important task to be promoted in addition to conventional studies on flavor and nutrition.

■ The rise and application of nutrigenomics

Research into the physiological function of food emerged from studies on functional food that began in Japan. Functional food is defined as food that can adjust physiological activity and prevent disease. From the research started in Japan, the concept of functional food spread throughout the world.

This endeavor soon advanced into studies on the relationship between food and variable gene expression. This resulted in the birth of a new science called nutrigenomics which attempts to assess the effects of functional foods through the comprehensive detection of cellular genetic responses.

The term nutrigenomics combines the words nutrition and genomics, which is the mapping of the entire genetic sequence of organisms. It was originally coined to describe a branch of science aiming to statistically identify the genes expressed when nutrients or food is ingested and in turn determine the physiological functions of these activated genes.

After food is ingested and absorbed by the body, certain components influence gene expression within cells via specific receptors. Therefore, it is possible to substantiate the effects and benefits of food by comprehensively analyzing such genetic expression and comprehending the biochemical consequences.

In 2004, about 30 food industry firms participating in the International Life Sciences Institute (ILSI) Japan joined forces to fund a special course on functional food science and nutrigenomics at the Tokyo University Graduate School

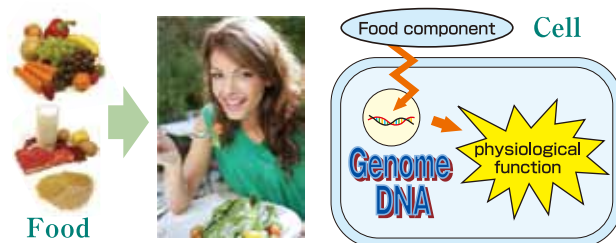
of Agriculture and Life Sciences. This project is currently using nutrigenomics to elucidate the physiological functions of substances such as soy protein, royal jelly, oligosaccharides, cocoa polyphenols and sesamin.

■ Using nutrigenomics to develop new applications for enzymes

As mentioned beforehand, research into the physiological function of food is now of utmost importance for the food industry. Nutrigenomics will undoubtedly discover substances with physiological functions beneficial for health or hazardous substances with the opposite effect. It may be possible to develop food with highly advantageous health benefits by utilizing the various enzymes acting on such substances, whether they be beneficial or hazardous. For example, food processing technology can utilize enzymes to create foods that enhance physiological functions or foods with less intolerance-inducing compounds and thus safer for certain populations. Consequently, in the future we may see the widespread development of special processing techniques using specific enzymes.

Nutrigenomics is a powerful tool that discovers new physiological functions of enzymes. The physiological effects of enzymes have conventionally been applied to pharmaceuticals. For example enzymes involved in digestion such as amylases, peptidases and lipases have been exploited in the field of medicine as the active ingredients of digestive aids. Similar enzymes are also used in dietary supplements sold in the United States to help digestion. Therefore, researchers will surely conceive new types of dietary supplements as advancements in nutrigenomics reveal the physiological functions of more enzymes.

We are presently working in collaboration with several universities to develop a new dietary supplement featuring oligosaccharide-producing enzymes. Oral administration trials on both animals and humans have revealed various benefits of this new product. We are in the process of using nutrigenomics to elucidate the effects and mechanisms of this novel enzymatic supplement.

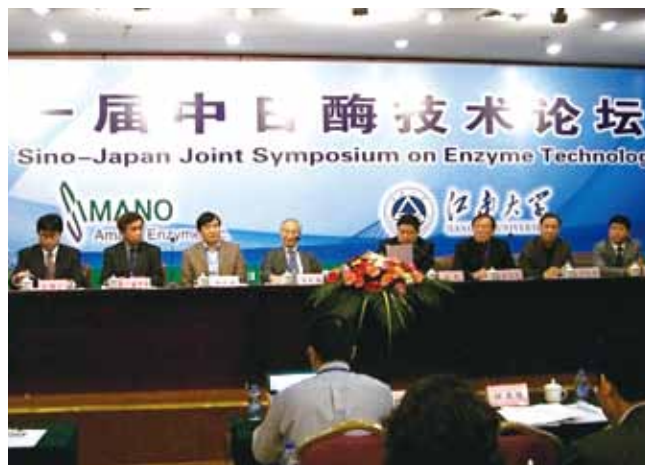


Topics **The 1st Sino-Japan Joint Symposium on Enzyme Technology**

On Saturday, October 29, 2011, Amano Enzyme and Jiangnan University located in Wuxi in Jiangsu Province of China, hosted the 1st Sino-Japan Joint Symposium on Enzyme Technology.

Held at the Jiangnan University campus for the purpose of encouraging exchange between Japanese and Chinese researchers and contributing to the advancement of enzyme technology in Asia, the event was attended by more than 100 participants including officials from Chinese universities, institutes and companies. Lectures addressed ten major topics and featured distinguished guests such as Dr. Sakayu Shimizu, Prof. Emeritus of Kyoto University and Prof. of Kyoto Gakuen University; Dr. Shi Wei Chen, Director of China Biotech Fermentation Industry Association; and Prof. Chen Jian, President of Jiangnan University. The symposium also presented a panel discussion on the future direction of enzymatic research and enzyme industry.

Amano Enzyme hopes this symposium will help advance technological exchange between Japanese and Chinese researchers as well as the enzyme industries in both countries.



The panel discussion



The International Union of Microbiological Societies (IUMS) held its general assembly in Sapporo in September 2011. Twenty-one years since the last assembly in Japan, the Sapporo meeting was the largest to date and featured a special appearance by the Emperor of Japan at the commemorative ceremony on September 10. The Prof.

Jokichi Takamine Research Group made a presentation on Prof. Takamine to open the Jokichi Takamine / Shibasaburo Kitasato Symposium. Here we, as a board member and active supporter of the Research Group, provide a short overview of the group as well a briefing on the contents and format of the symposium.



Taka-Diastase in its original packaging

#### [The Prof. Jokichi Takamine Research Group]

The mission of this nonprofit organization is: to educate society about Jokichi Takamine and the contributions he made in various fields such as encouraging the advancement and industrialization of scientific technology in modern Japan and promoting friendship between Japan and the United States; to teach as many people as possible about this great man; and to develop new human resources and offer hope and purpose to the younger generation who will become leaders of the future. The group continues to study the life of Prof. Takamine by gathering information, publishing a newsletter and holding lectures to convey a proper representation of this great scientist.

#### [Lecture on Prof. Takamine]

Joan W. Bennett, Vice President of the IUMS and member of the research group, presented an extremely interesting talk on Prof. Takamine and his family, using pictures and photos from the Edo and Meiji Periods.

Yutaka Yamamoto, the Director General of the Research Group, described how Prof. Takamine developed enzymes for industrial use and gave specific examples of their application. He also explained that those enzymes are still benefiting humanity today and went on to elaborate on the potential advantages of enzymes to alleviate the worldwide problem of environmental destruction.

He also talked about Prof. Takamine's humanitarian contributions in fields other than science. Of special note are the Shofu-den and the cherry trees in Washington DC.

#### The Shofu-den

The Shofu-den (pine and maple palace), originally constructed as the Japanese pavilion for the 1904 St. Louis World EXPO, was given to Prof. Takamine by the Japanese government and transported to his summer home in upstate New York. With a traditional-style architecture embodying Japanese culture, the Shofu-den has been used for many years as a stage for exchange between Japan and the United States.



The Shofu-den

#### The Washington DC Cherry Trees

Prof. Takamine lobbied the Japanese government to donate 3,000 cherry tree saplings to the United States and this led to the famous row of cherry trees seen along the Potomac River in Washington DC. This is just one memorable example of Prof. Takamine's significant contributions to international friendship and fields beyond science.



The Washington DC cherry trees

Prof. Takamine, who is sometimes called the father of modern biotechnology, showed the world the importance of microbial enzymes to humanity by developing a type of amylase called diastase. Sales of diastase in Japan began in 1899; by sheer coincidence, this was the same year when Amano Enzyme was established. Amano Enzyme is committed to pursuing the unlimited possibilities of enzymes to create new health benefits and contribute to society.

## ► The new Swiss office of Amano Enzyme Europe Ltd.

In April 2011, Amano Enzyme Europe Ltd. (AEE) opened an office in Lugano, Switzerland. This facility will act as a base for data gathering in preparation for market expansion from Western to Eastern Europe. Located in the southern part of Switzerland, Lugano is about 50 km to the north of Milan in Italy. The office is situated within the city's World Trade Center, which is about a five-minute walk from the Lugano Airport. The close proximity of the airport makes the office easy to access from major cities around the world. Until now, emerging markets in Eastern Europe, Russia and other regions were under the jurisdiction of our AEE UK office. However, establishing a base in Continental Europe now allows us to respond more precisely to customer needs. One year has passed since we opened the Lugano office and we hope to make further advancements towards customer satisfaction.



Branch Manager Sugawara of the Swiss office

## ► Relocation of the Amano Enzyme China Ltd. office

Amano Enzyme China Ltd. relocated its office in July 2011. The new office is located near the Changping Road Station on Line 7 of the Shanghai Metro.

The new office is equipped with a laboratory in order to respond to customer requests for enzyme application tests. Possessing many analytical devices such as an HPLC, the lab is running smoothly and we hope it will help improve customer satisfaction by facilitating proposals for new enzyme applications and offering solutions to problems.

Address: C3-5F, 800SHOW, No. 800, ChangDe Road, Shanghai



Mr. Hui in charge of applied experiments at the AEC lab

## ► A new plant at Amano Enzyme Manufacturing (China) Ltd.

Construction of a new plant at Amano Enzyme Manufacturing (China) Ltd. (AEMC), Amano Enzyme's production base in China, will begin in June 2012.

The new plant will be located in the Siyang Economic Development Zone just 10 km away from the present plant in Siyang County, Jiangsu Province. The 30 km<sup>2</sup> Economic Development Zone is spacious and boasts modern infrastructure, and therefore we believe it is an ideal place for a new production facility.

With a total area of approximately 40,000 m<sup>2</sup>, the new plant will be twice the size as the present one. Controlled management of the fermenter and cooling operations in the refinement process will be fortified to achieve stable supply of product and promote quality improvement. The plant will also have its own wastewater processing facility, which will work in tandem with the zone's proprietary wastewater facility to reduce the burden on the environment.

We hope the new plant will help us produce products that will bring more satisfaction to our customers.



The new AEMC plant under construction



Enzyme-Explore Unlimited Possibilities

<http://www.amano-enzyme.co.jp/>

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