



Amano Enzyme Group

Corporate Presentation

Amano Enzyme Inc.
April 2024

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About Amano Enzyme

Amano Enzyme corporate philosophy

Making The Intangible Tangible

- Frontier spirits
- Philosophy of co-existence
- Sustainable Growth



Genichi Amano
(1948 – 1971 President)

Corporate history

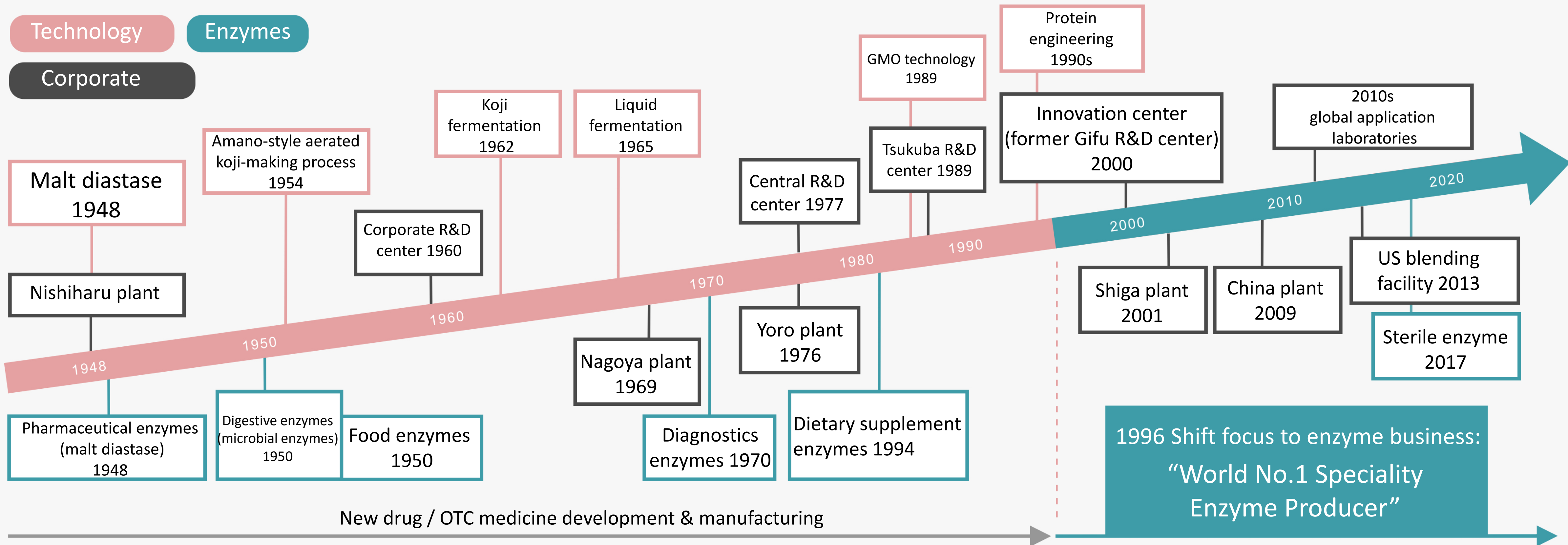
1899	Ennosuke Amano started a household medicine distribution business in Japan	1983	Established Frankfurt office in Germany →1992 Integrated European office to Amano Enzyme Europe Ltd. In the U.K.
1939	Genichi Amano entered the household medicine market in China	1996	Shift the resources to the enzyme business; “World No.1 Speciality Enzyme Producer”
1948	Established Amano Pharmaceutical Co., Ltd and started the production of pharmaceutical-grade malt diastase	2000	Changed the corporate name to Amano Enzyme Inc.
1950	Opened Nishiharu plant for the production of pharmaceutical-grade microbial diastase	2001	Opened Gifu R&D center
1957	Patented Amano-style aeration koji production instrument	2001	Acquired the majority stake of Daiwa Kasei K.K. →2013 Merged Daiwa Kasei K.K. as Amano Enzyme Shiga Plant
1960	Opened Central Research Institute	2007	Opened Amano Enzyme China Inc. (AEC) and Amano Enzyme Manufacturing (China) Ltd. in China
1961	Started the production of food-grade enzymes	2018	Merge AEC into Amano Enzyme Manufacturing (China) Ltd. and renamed AEC to Shanghai branch.
1969	Opened Nagoya plant	2018	Opened Amano Enzyme Asia Pacific Co., Ltd. In Thailand
1970	Started the production of diagnostics enzymes		
1976	Opened Yoro plant		
1980	Agreement signed with Nanjing, China, on compensation trade of pancreatin		
1981	Established Amano International Enzyme Co., Inc. (AIEC) →1992 Renamed AIEC to Amano Enzyme USA Co., Ltd.		

120+ years of history

70+ years in enzyme business

70 years in enzyme business

Amano Enzyme has been researching nature's enzymes to develop and manufacture microbial enzymes for over 70 years since 1948.



About enzymes

What are enzymes?

Enzymes are proteins that act as catalysts in all living organisms – microorganisms, plants, animals, and humans. As catalysts, enzymes serve as compounds that increase chemical reactions in biological systems.

How do enzymes work?

- Break down the food to digest and convert them into energy
- Act as part of the body's defence system, generating and breaking down substances in the body

Type of enzymes?

- Approximately 8,000 enzymes are approved and registered by NC-IUBMB*
- Enzymes are classified into seven categories based on the types of reaction catalysed such as oxidoreductase and hydrolases.

Advantage of enzymes in chemical reactions

- 1 Allows some industrial reactions to happen at lower temperatures and pressures than traditionally needed.
- 2 Eliminate undesirable by-products
- 3 Sustainable use of resources as enzymes are produced mainly by microbial fermentation

* NC-IUBMB = Nomenclature Committee of the International Union of Biochemistry and Molecular Biology

The discovery of enzymes and history of industrial uses

1814	Kirchhoff (Russia) used malt extract to convert starch into sugar.
1833	Payen and Persoz (France) isolated enzyme to convert starch to sugar in malt extract (named Diastase)
1836	Schwann (Germany) discovered enzyme responsible for digestion in the porcine stomach (named Pepsin)
1874	Christian Hansen (Denmark) commercialised rennet derived from calf for cheese making process.
1878	Kühne (Germany) proposed the name “enzyme” (“in yeast” in the Greek)
1895	Takamine (Japan) developed and launched taka-diastase derived from <i>Aspergillus oryzae</i> for the digestive medicine.
1897	Buchner (Germany) discovered that protein in yeast extract can form alcohol from a sugar solution (Awarded Nobel Prize for Chemistry)

ENZYMES WITH UNLIMITED POSSIBILITIES

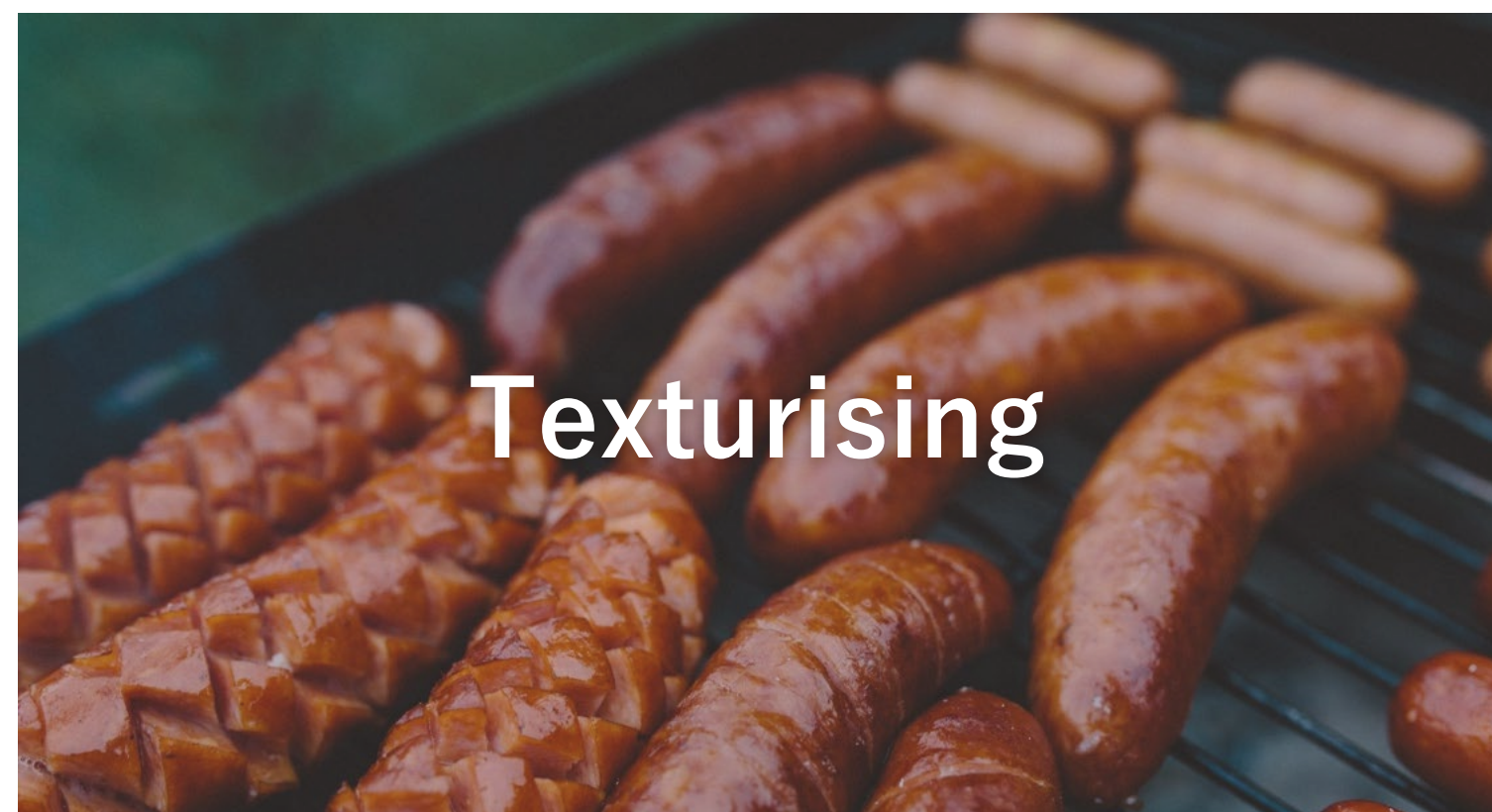
We only identified 0.01% of all microorganisms

0.01%

About our business

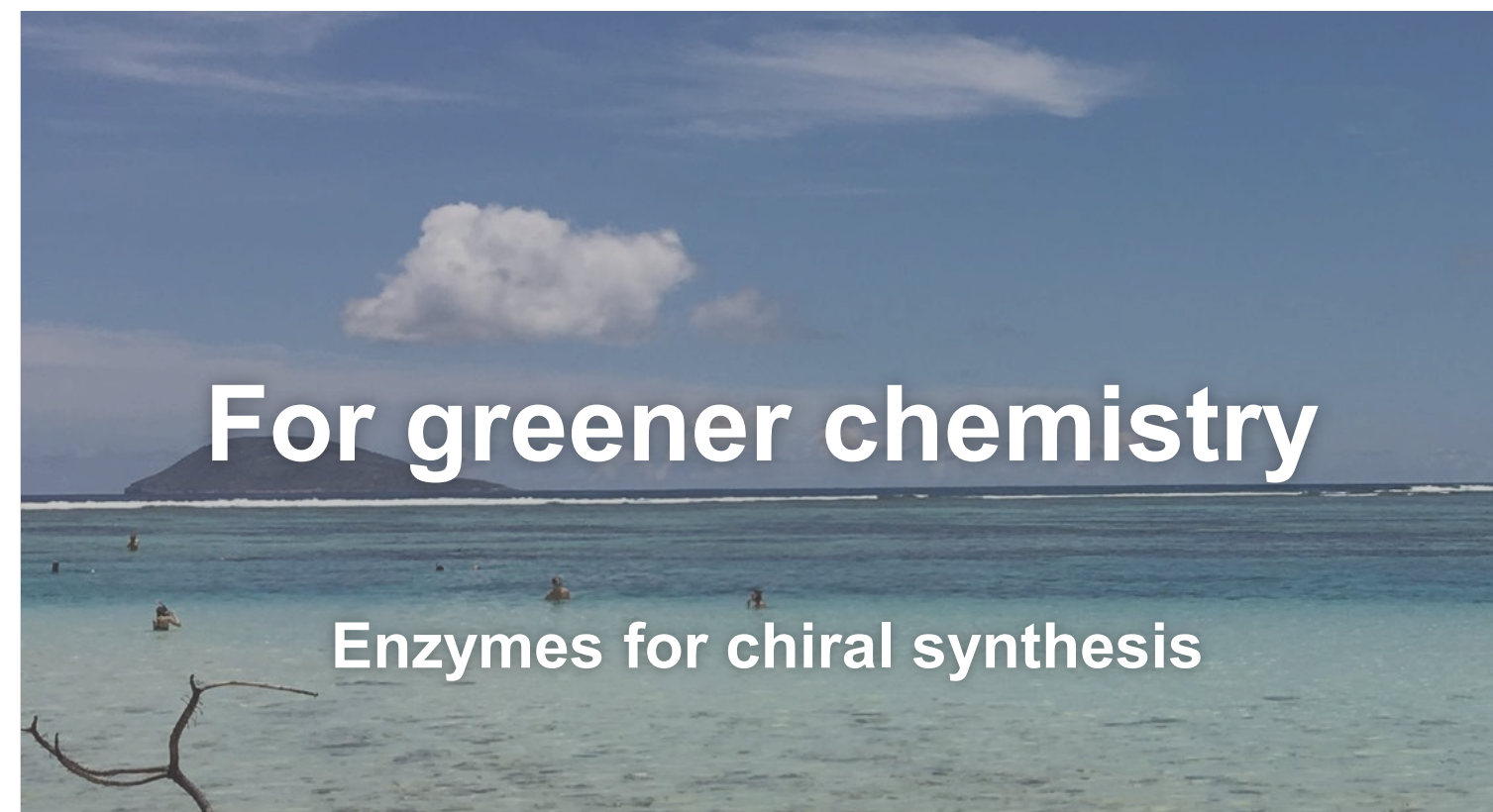
For a world with tastier foods

We have a long history of using nature's enzymes in our food culture even before we discovered enzymes and their properties and functions. Amano will continue applying enzyme technology to solve various challenges in food processing.



For a healthier world

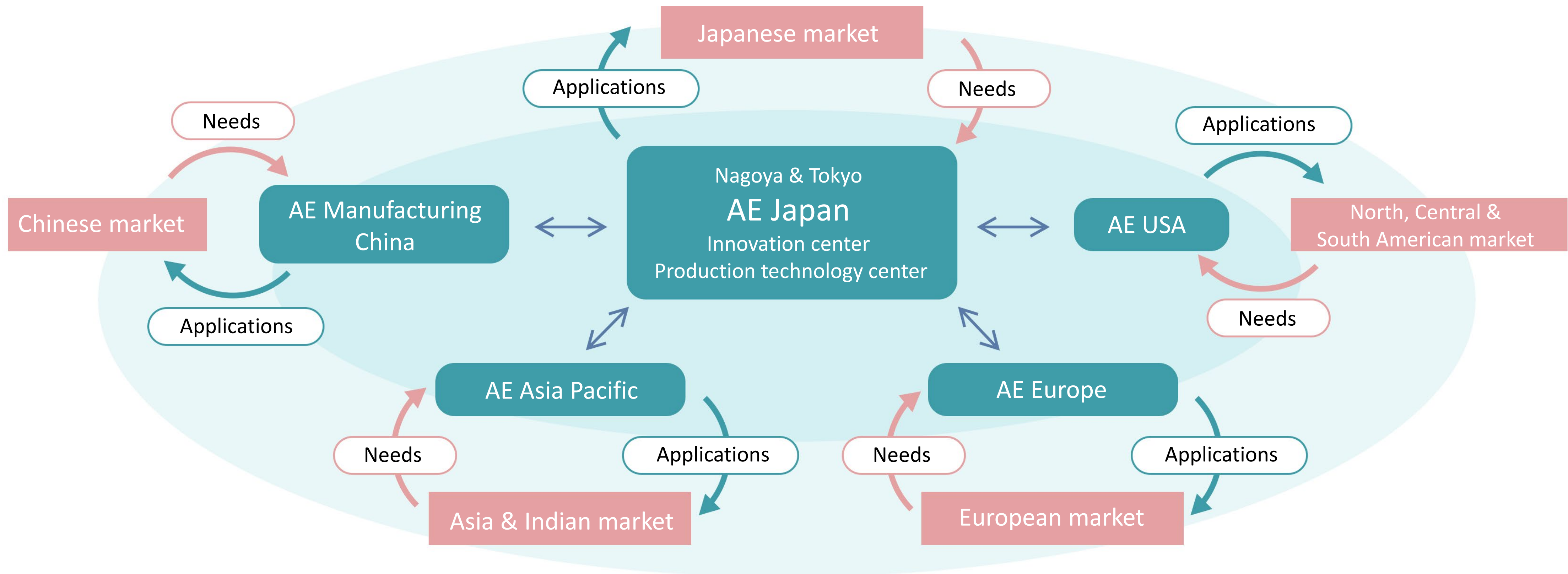
Amano started pharmaceutical-grade diastase business and has grown its portfolio to contribute to a healthier world.



R&D and Sales & Marketing

Amano has an extensive strain library (over 20,000 microorganisms obtained from a variety of environments such as deep sea)

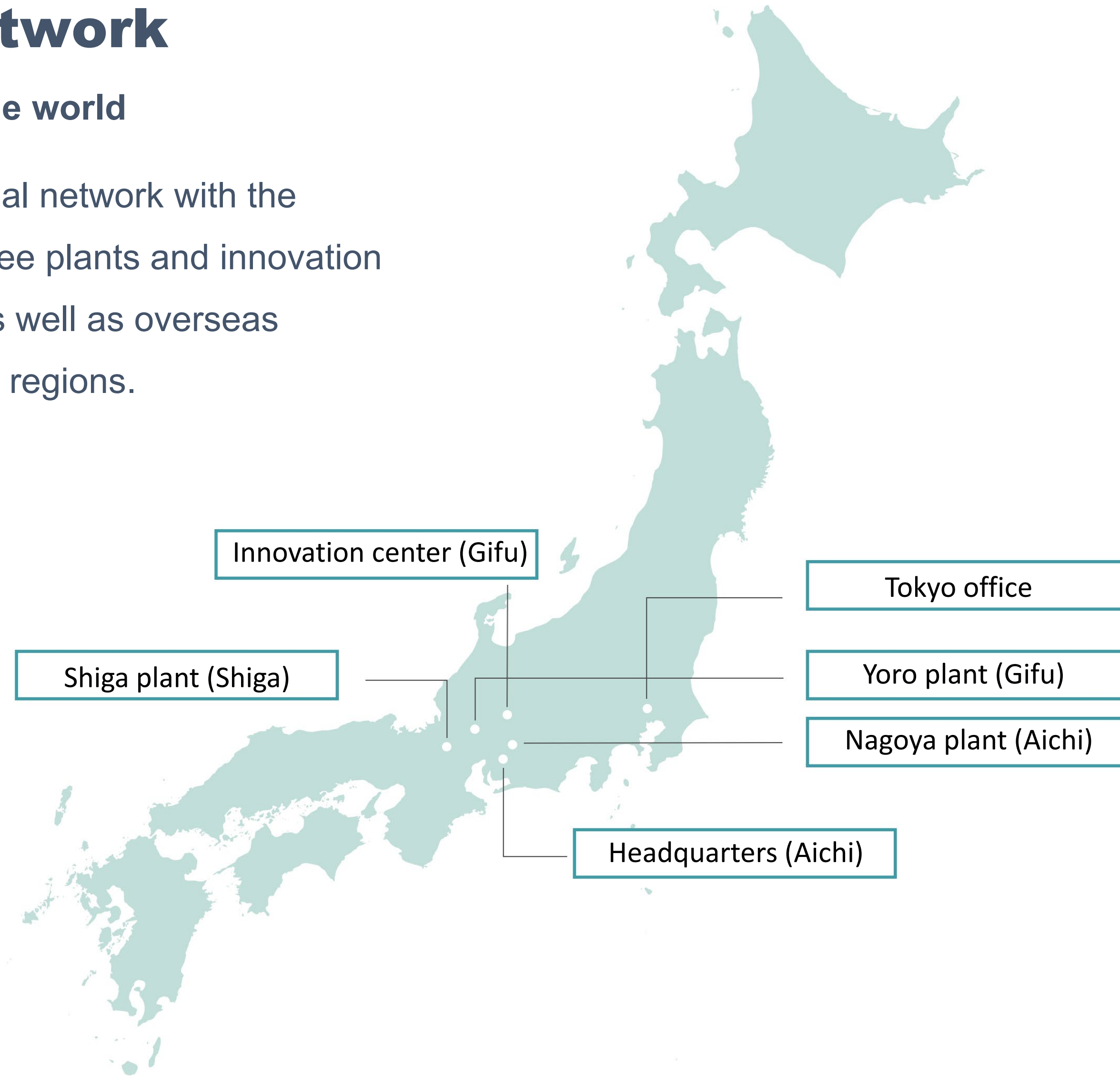
Innovation center and production technology center continue working on the discovery of new enzymes and yield improvement whilst regional application centers to offer technical support to our customers.



Global network

From Japan to the world

Amano has a global network with the headquarters, three plants and innovation center in Japan as well as overseas business across 5 regions.



Overseas business



Innovation Center (Gifu, Japan)

Quality Assurance

Deliver consistent and high quality and compliance worldwide

Manufacturing the products with consistent and high quality

- GMP for API
- FSSC22000
- ISO13485
- ISO14001
- Regional regulatory requirements

Meeting various requirements

- Kosher, Halal
- Vegan
- Non-GMO

About our future

Corporate Social Responsibility

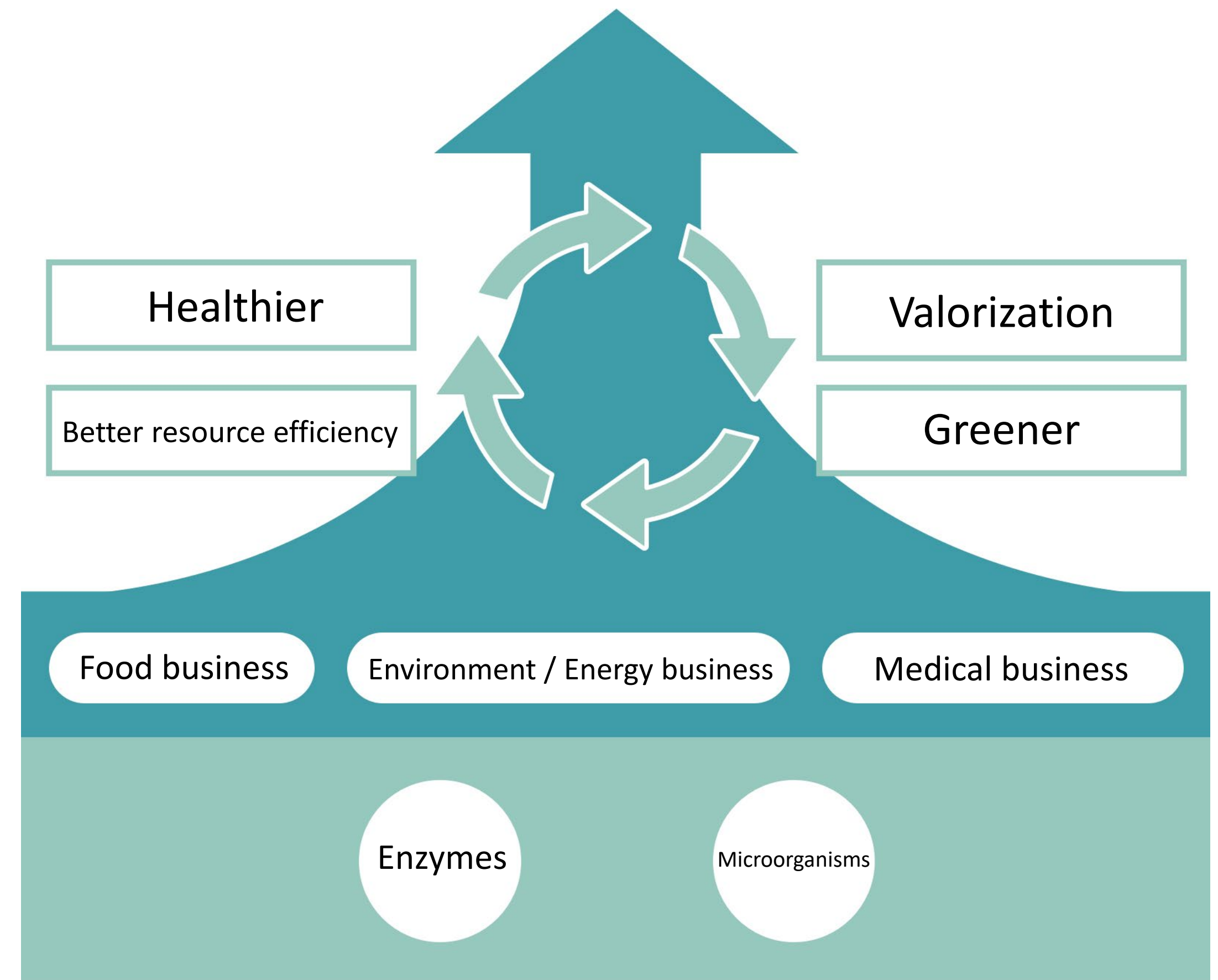
Amano group and the SDGs

Amano Enzyme has put the Japanese culture of coexistence with nature at the heart of our business. Biotechnology is our wisdom to achieve coexistence with nature and enzymes are the key technology.

In 21st century, we are facing sustainability challenges in food, energy, resources and environments. We believe enzymes play a pivotal role in the sustainable development.



Contribute to sustainability

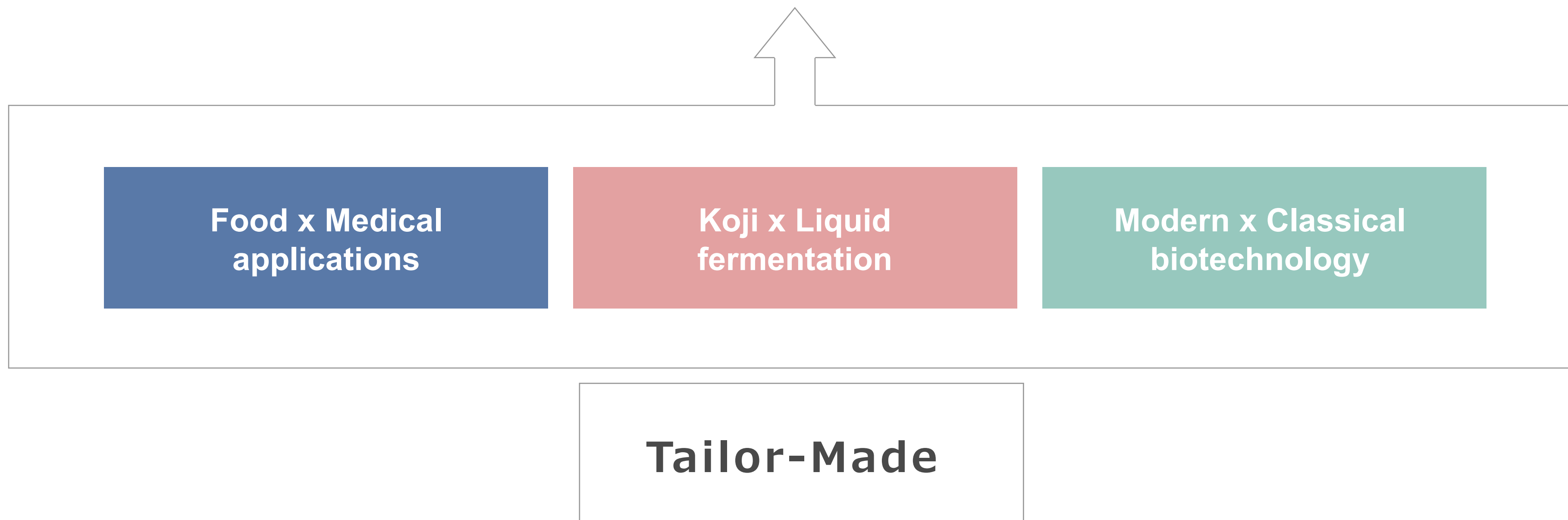


The Three Synergies and Tailor-Made

120+years of history and 70+ years of experience in enzyme technology support Amano to further contribute to sustainability.

No.1 Speciality

Make a better world with Japanese biotechnology



Medical x Food applications

Medical Application



- Digestive enzymes
- Dietary supplement
- Chiral synthesis
- Diagnostics
- Regenerative medicine



Food application



- Protein
- Sugar
- Fats & Oils
- Seasoning & Flavour
- Fermentation

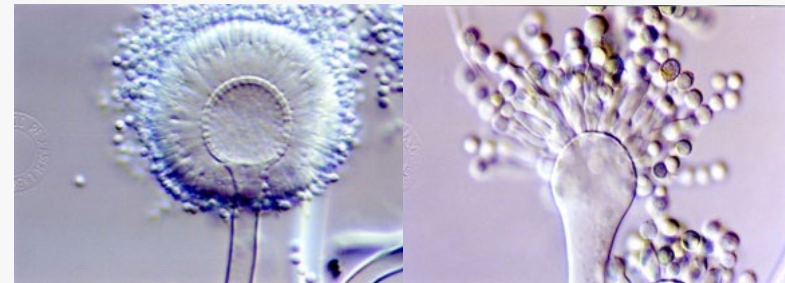
➔ Leveraging our expertise in medical and food areas to develop innovative applications with consistent and high quality

Koji x Liquid fermentation

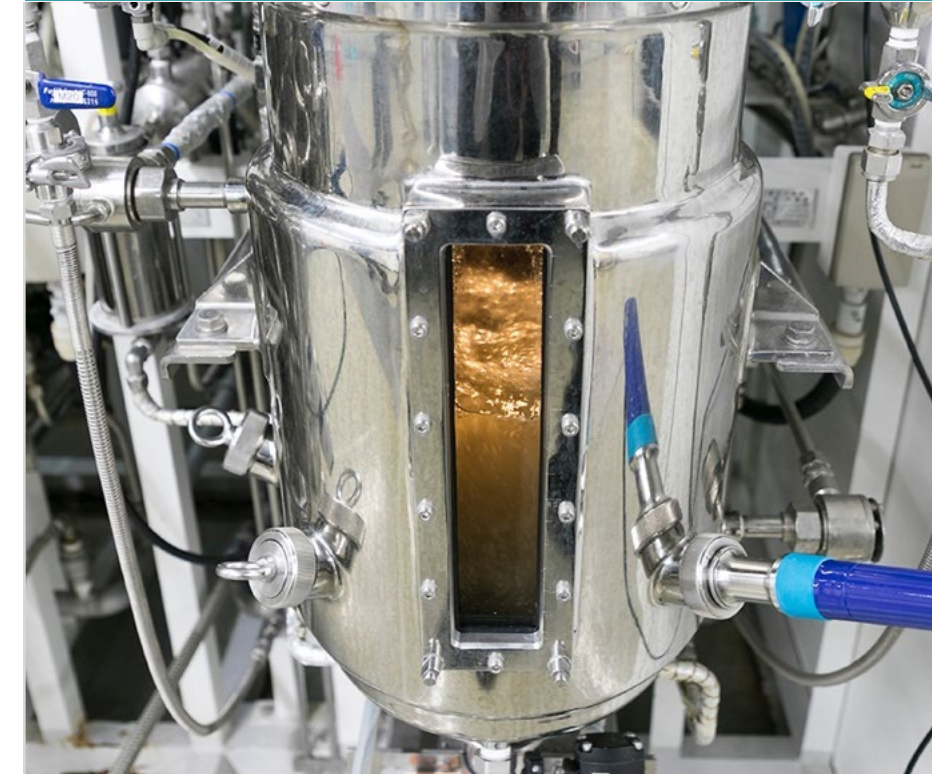
Koji fermentation



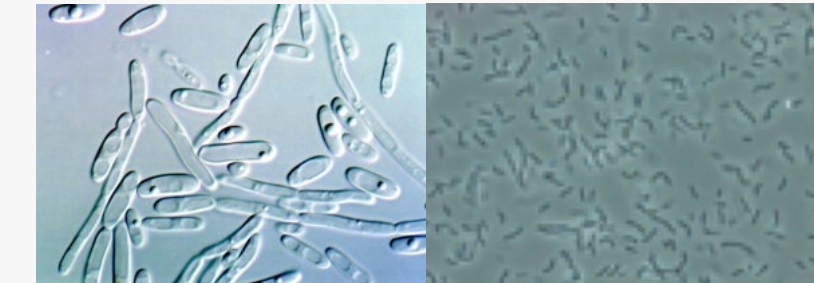
- Fungi



Liquid fermentation



- Yeast
- Bacteria

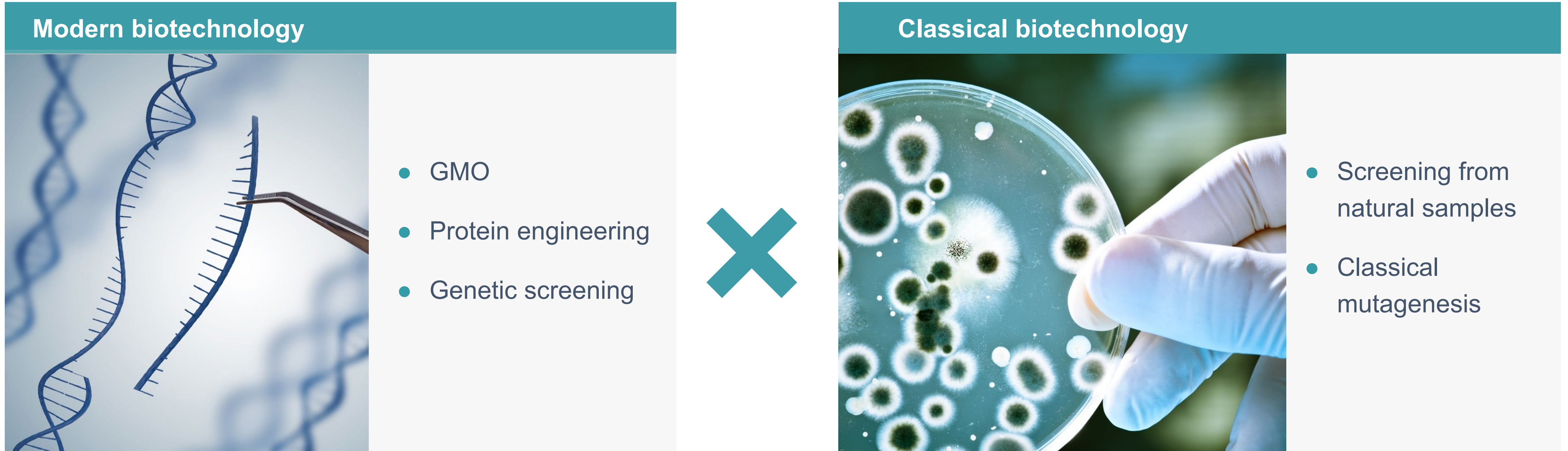


Production technology

Microbiology quality control / Fermentation / Extraction / Purification / Commercialisation (powder, granulation, liquid)

➔ Enable the production of a wide range of unique products with Koji and liquid fermentation and production technology

Modern x Classical biotechnology



➔ Differentiate and create a unique value proposition with modern and classical biotechnology

The national microorganisms of Japan (*Aspergillus oryzae*)

Koji-kin (*Aspergillus oryzae*) is registered as the national microorganism of Japan at Brewing Society of Japan in 2006.

Koji-kin is an essential part of the Japanese diet and contributes to 1% of GDP. It is widely recognised as it were a national treasure of Japan.

- **Microbe Mound**

Microbe Mound was built in order to pay our deepest request to the innumerable souls of microbes who have dedicated and sacrificed for the existence of humans



人類生存に大きく貢献し
犠牲となれる無数億の菌の霊に対し
至心に恭敬して茲に
供養の懺捧ぐるものなり

曼殊院門跡第四十世
大僧正 圓道
菌塚題字・坂口謹一郎先生筆



Koji-kin
(*Aspergillus oryzae*)

The National Flower



The National Bird



The National Butterfly



The National Fish



Searching for new microorganism

Japan is rich in microbial resources

The islands of Japan stretch a long distance from north of Hokkaido to south of Okinawa and cover a wide range of climatic zones.

Japan also has a sixth largest Exclusive Economic Zone (EEZ) in the world, including deep sea such as Ogasawara trench.

As a result, Japan is considered rich in microbial resources.

Length of Japan :

Approx. 2,800km from Okinotori-shima (south) to Wakkanai (north)

Elevation of Japan :

Ogawasara Trench -9,780m
Mt. Fuji +3,776m

Searching for new microorganism

From desert in Mongolia to rainforest in Vietnam, Myanmar and Indonesia (part of NITE joint project)



Even in extreme environments

We have also searched for microorganism in the extreme environments that it is considered possible to find zero trace of life.

- From deep sea (JAMSTEC)
- From Earth's Stratosphere (ISS-IEM Mission Tanpopo)

Extremophilic microorganisms	
Temperature	Thermophiles, Psychrophiles
pH	Acidophilies, Alkaliphiles
Oxygen	Anaerobes, Aerobes
Salt	Halophiles
Pressure	Barophiles
Nutrients	Oligotrophies
Solvent	Solvent-resitant microorganism
Radiation	Radiation-resistant microorganism



Appendix

Amano Enzyme Science and Technology Foundation

Established in 2017 to support Enzyme Symposium in the long term – Amano Enzyme group’s corporate social responsibility programme.

Board members including the industry experts believe in unlimited possibilities of enzymes and the foundation promotes advanced research and development for enzymes.

- **Enzyme Symposium**

Launched in 2000 as part of the 100th anniversary project.

The symposium awards research grant for applied research projects that demonstrate the impact on the wider economy and society

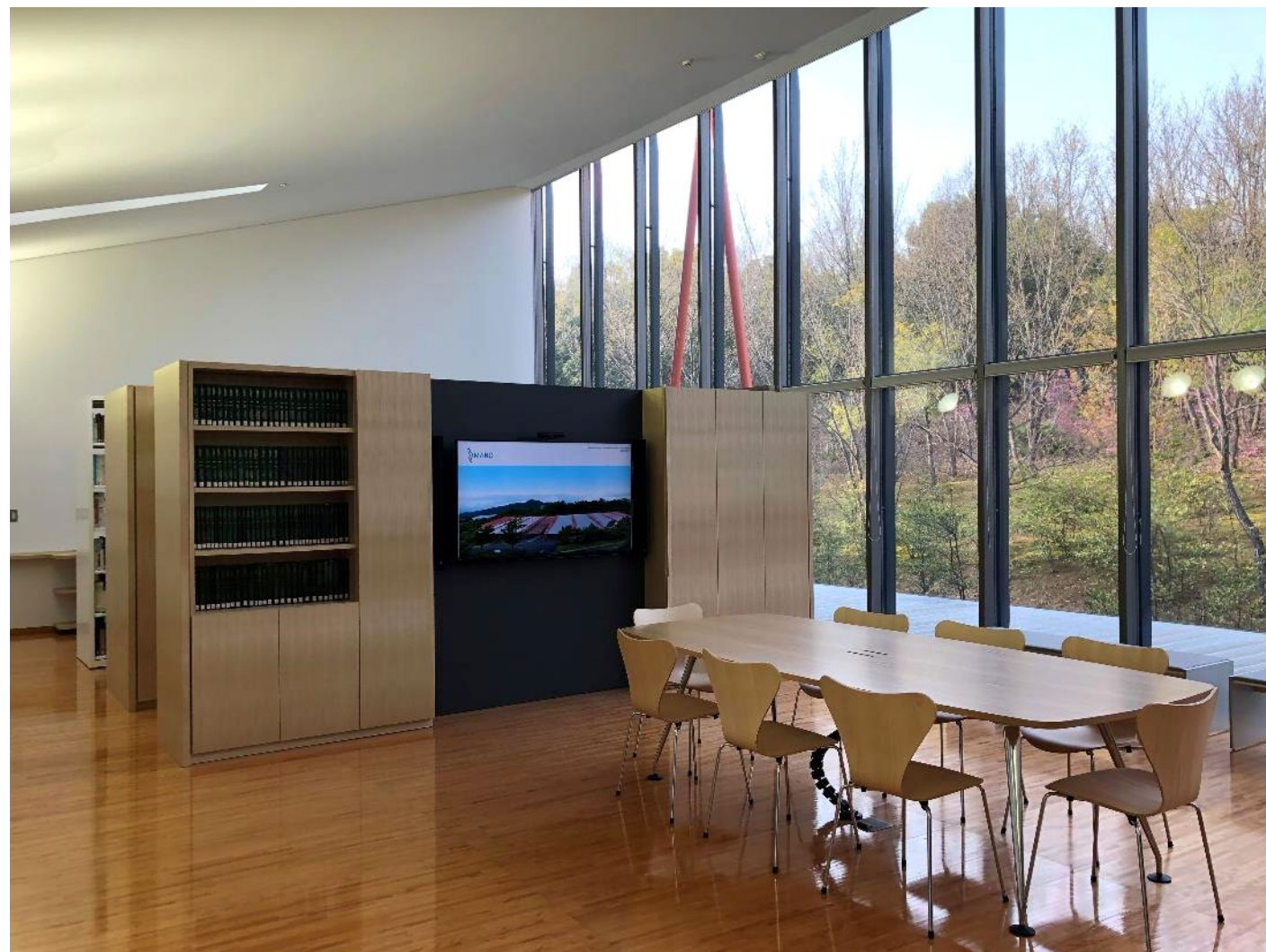


Appendix

Enzyme Application Studio

- Co-Creation Space

Communication space for co-creation.



- Application Laboratory

Laboratory and kitchen facilities are also available.

You can try our enzymes in person.



- Literature library for enzymes

A comprehensive resource section about the history of enzyme utilization.

Books mainly related to enzymology are exhibited.





日本のバイオテクノロジーで、
世界を変える。

Contact

Amano Enzyme

www.amano-enzyme.com



<https://www.linkedin.com/company/amanoenzyme>