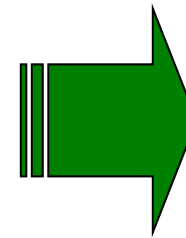


**Collaborative Research on Development of
Useful Microbial Resources in Tropical Environments
With South-East Asian Young Researchers**

Mamoru Yamada

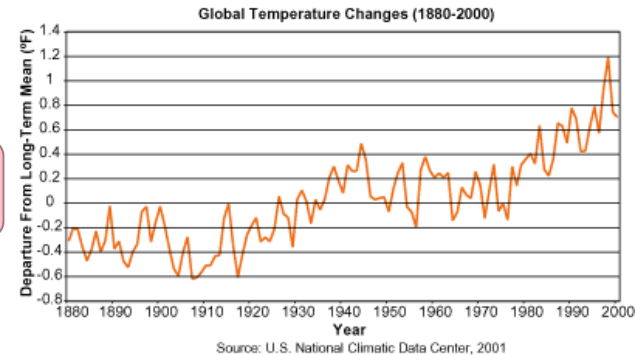
Yamaguchi University

Thermotolerant Microorganisms



Fermentation Innovation with Thermotolerant Microbes

Recent Global Warming



**Industrial Fermentation : Increased Cooling Cost
Requirement for CO₂ Reduction**

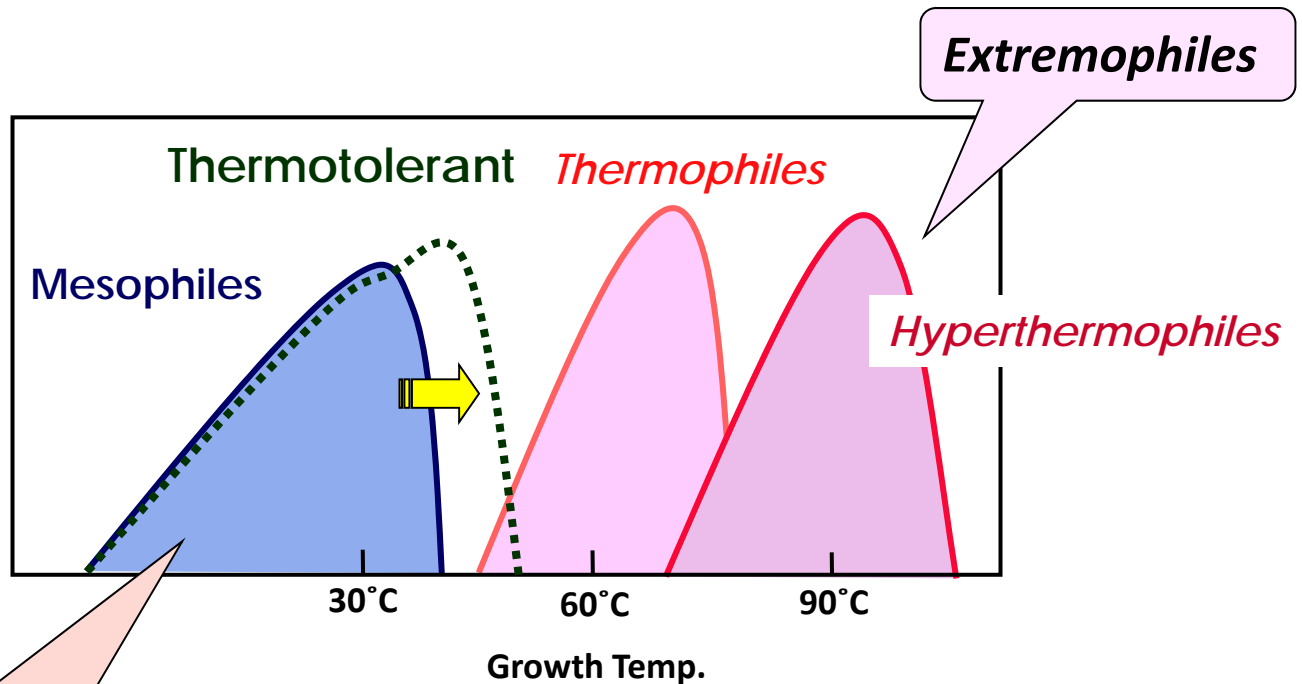
Development of Thermotolerant Fermentative Microorganisms

High temperature Fermentation •
Biodegradation
Reduction of cooling expense
Easy fermentation management
Biomass Utilization

**Stable Fermentation
in Tropical Countries**

CO₂ Reduction

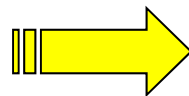
Thermotolerant Microbes and their Possible Applications



Near Our habitat

Microbes useful for Fermentation and for Bioremediation

Yeast · Fungi · LAB · Actinomyces · AAB *etc*



Thermotolerant Microbes

Isolation & Characterization of the strains

Its Industrial Applications

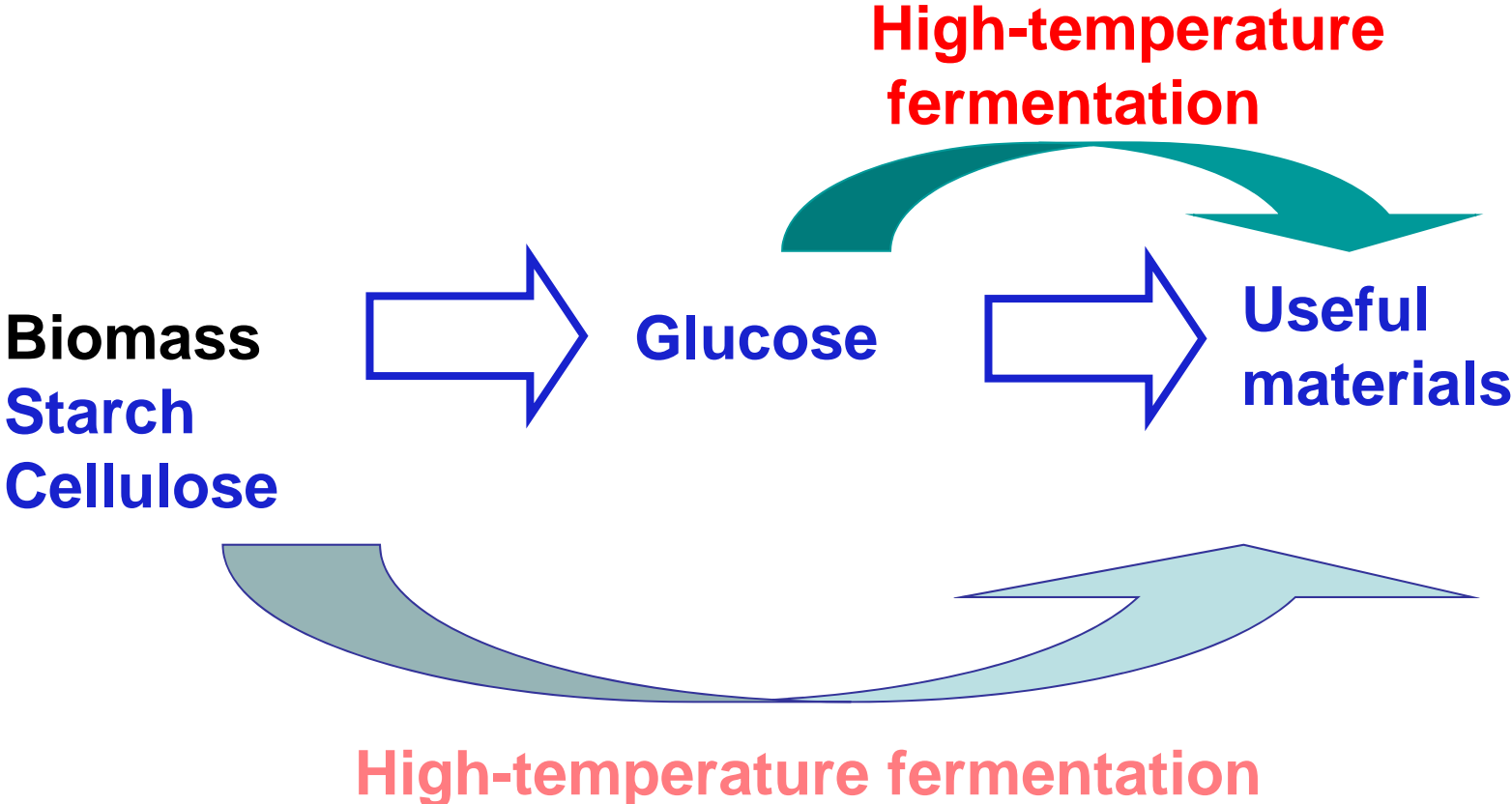
Tropical habitat

nature and fermented foods in Thailand

Useful thermotolerant microbes isolated

Microbes	<i>Representative strains</i>	Fermentation temp.	Useful ability
Yeast			
	<i>Kluyveromyces marxianus</i> DMKU3-1042	45°	Alcohol fermentation
	<i>Ogataea chonburiensis</i>	37°C	Xilitol fermentation
Acetic Acid Bacteria (AAB)			
	<i>Acetobacter pasteurianus</i> SKU1108	40°C	Acetic acid fermentation
	<i>Acetobacter pasteurianus</i> MSU10	37°C	Acetic acid fermentation
	<i>Acetobacter tropicalis</i> SKU1100	42°C	Polysaccharide
	<i>Gluconobacter frateurii</i> CHM54	38.5°C	Sorbose fermentation
	<i>Gluconobacter frateurii</i> THF55	37°C	Ketogluconate fermentation
Lactic acid bacteria (LAB)			
	<i>Lactobacillus thermotolerans</i>	40°C	Probiotics
	<i>Enterococcus faecium</i>	40°C	Bacteriocin
Other microbes			
	<i>Zymomonas mobilis</i>	41°C	Alcohol fermentation
	<i>Corynebacterium glutamicum</i> I2L	37°C	Glutamate fermentation
	<i>Bacillus coagulans</i> 191TP1	50°C	Lactic acid fermentation
	<i>Rhizopus microsporus</i> TISTR3518	40°C	Lactic acid fermentation
Mixed culture			
	Novel bacteria (unidentified)	35~40°C	Bioplastic
	Anaerobic Sludge (Fermentative anaerobes)	35°C~55°C	Methane · H ₂

HTFT



Advantage of HTFT

- **Reduction of cooling cost**
- **Increase in reaction speed**
- **Reduction of contamination**
- **Easy operation**
- **Utilizable in tropical countries**

Fermentation Industry

General Industries

Foods : Cheese, Yogurt, Natto, Vinegar, Miso, Soy sauce
Liquors: Beer, Sake, Wine, Whisky

New Industries

Medicines: Antibiotics, Anticancer drugs, Hormones, Pill
Chemicals & Materials: Amino acids, Nucleotides,
Sugars, Organic acids

Enzyme Industries

Enzymes for Medical purposes, Industries, Food process,
Researches

Bioremediation Industries

Core University Program

(1998-2007)

Yamaguchi Univ

Kasetsert Univ

Asian Core Program

(2008-2012)

Yamaguchi Univ

Khon Kean Univ

supported by JSPS and NRCT

JENESYS Program

(2008)

**Follow-up Activity of Young Microbiology Researchers
In Thailand Aiming on Further Development of collaboration
Between Japan and Thai on Thermotolerant Microbial Resources**

JENESYS Program

(2009-2010)

**Collaborative Research on Development of
Useful Microbial Resources in Tropical Environments
With South-East Asian Young Researchers**

supported by JSPS



The 2nd Young Scientist Seminar, 2009

JENESYS Program
supported by JSPS

- **2008: 16 Thai**
- **2009-2010: 18 Thai**
3 Vietnam
2 Indonesian

Asia-Africa Science and Technology Strategic Cooperation Promotion Program

PROBRAIN

RCTMR

Asia
Core
Program



Prof. Yamada
Prof. Matsushita
A. Prof. Hoshida
A. Prof. Higuchi

Fundamental Exp.

Prof. Savitree
A. Prof. Gunjana



Preliminary Exp. Kasetsert U

Kyushu U
Prof. Sakai

KKU A. Prof. Vichai
PSU A. Prof. Poonsuk

JST

NRCT

Pilot test
TISTR
Dr. Suparp

ARDA
Dr. Napavarn

High-temp. fermentation Industry
Bio-fuel Food Drug Chemicals

Economical
Fermentation technology

New Technology

MEXT-ARDA Project

JSPS-JENESYS

Asian Core Program

JSPS-NRCT Core Program

Pilot Test

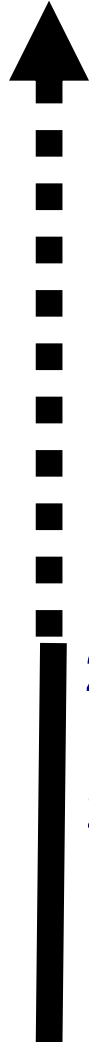
Mechanism
Applied
Study

Thermo-
tolerant
microbs
Basic Study

2010

2008

1998



Thank you for your attention