International Workshop on
50th Anniversary of *Thermus thermophilus* Discovery

September 28 (Fri) – 29 (Sat), 2018
Atagawa-Heights Training Center, Izu, Shizuoka, Japan

Organized by

Thermus thermophilus Anniversary Committee

Co-organized by

Japanese Whole-Cell Project of *Thermus thermophilus* HB8
Society for the study of primary biomaterials in the origin and evolution of common cellular activities

Supported by

The Japanese Biochemical Society
The Japan Society for Bioscience, Biotechnology, and Agrochemistry
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JT Biohistory Research Hall
Protein Science Society of Japan
Society for Whole-Organism Science
Japan Society for Archaea
Kawazu Tourist Association

Friday, September 28

13:00 – 13:15 **Opening Session**
Yoshitaka Bessho
Tairo Oshima

Session 1: Structural Genomics and Proteomics
(Session Chair: Akio Kanai)

13:15 – 13:30 **Toward the next stage of *Thermus thermophilus* HB8** **[1]**
Seiki Kuramitsu (Osaka University, Japan)

13:30 – 14:00 **Next-generation proteomics and metaproteomics for extremophile characterization and discovery** **[2]**
Jean Armengaud (CEA, Li2D, Laboratory, France)

Session 2: Database and BioResources
(Session Chair: Hirotada Mori & Kazuo Harada)

14:00 – 14:15 **Toward a renewal of ThermusDB for unveiling the function of function-unknown proteins** **[3]**
Kei Yura (Ochanomizu University, Japan)

14:15 – 14:30 **Microbial and genetic resources derived from *Thermus thermophilus* HB8 in RIKEN BRC** **[4]**
Takashi Itoh (RIKEN BioResource Research Center, Japan)

14:30 – 14:50 **Taking Photographs of All Members**

Session 3: Genome and DNA Technology
(Session Chair: Masaharu Ishii & Yoshinori Koyama)

14:50 – 15:05 ***E. coli* Systems Biology: Genetic interaction analysis by Double Knockout and Population dynamics by Bar-seq** **[5]**
Hirotada Mori (Nara Inst. of Sci. and Technol., Japan)

15:05 – 15:20 **Genomic DNA Synthesized by Genome Vector from *Bacillus subtilis*** **[6]**
Shinya Kaneko (Tokyo Institute of Technology, Japan)

15:20 – 15:35 **Improvement of a host-vector system in *Thermus thermophilus* HB27** **[7]**
Akira Nakamura (University of Tsukuba, Japan)

Session 4: Extermobiology (1)
(Session Chair: Yutaka Kawarabayasi)

15:35 – 15:50 **The bacteriophages infectious to *Thermus thermophilus*** **[8]**
Masatada Tamakoshi (Tokyo Univ of Pharm & Life Sci., Japan)

15:50 – 16:20 **Verrucomicrobia Methanotrophs, a Novel Group of Extremophiles Adapted to Acidic Geothermal Environments** **[9]**
Nils-Kåre Birkeland (University of Bergen, Norway)

16:20 – 16:50 **Short Break**

Session 5: Nucleic Acid and Ribosome
(Session Chair: Fumio Arisaka & Shin-ichi Yokobori)

16:50 – 17:05 **Bacterial cell recovery from severe heat shock may provide insights on the origins of life** **[10]**
Akio Kanai (Keio University, Japan)

17:05 – 17:20 **Interspecies exchange of 16S rRNA genes in *Thermus thermophilus*** **[11]**
Kentaro Miyazaki (AIST, Japan)

17:20 – 17:30 **RNomics of *Thermus thermophilus* HB8** **[40]**
Gota Kawai (Chiba Institute of Technology, Japan)

17:30 – 17:40 **Xenobiology: genetic alphabet expansion using unnatural base pairs** **[12]**
Michiko Kimoto (A*STAR, Singapore)

17:40 – 17:50 **Biosynthesis of Sulfur-modifications of tRNA in *Thermus thermophilus*** **[13]**
Naoki Shigi (AIST, Japan)

Session 6: Metabolism (1)
(Session Chair: Fumio Arisaka)

17:50 – 18:00 **Identification of novel and distinct biosynthetic pathway of UDP-GalNAc from acidothermophilic archaeon *Sulfolobus tokodaii*** **[14]**
Yutaka Kawarabayasi (AIST, Japan)

18:00 – 19:30 **Dinner**

19:30 – 20:00 **Poster Preview Short Talk** *(Chair: Kohsuke Honda)*

Session 7: Extremobiology (2)
(Session Chair: Yoshitaka Bessho)

20:00 – 20:30 **Thermophilic Enzymes for Synthetic Biology: *in vivo* and *in vitro* cascades** **[15]**
Jennifer Ann Littlechild (University of Exeter, UK)

20:30 – 21:00 **Eyes, Sleeping and *Thermus thermophilus*** **[16]**
Tairo Oshima (Kyowa Kako Co., Ltd., Japan)

21:00 – 22:30 **Poster Presentation: (A) Odd, (B) Even**

22:30 – 24:00 **Mixer**

Saturday, September 29

7:30 – 8:30 **Breakfast**

Session 8: Metabolism (2)
(Session Chair: Naoki Nemoto & Shinsuke Fujiwara)

9:00 – 9:15 **Discovery of unprecedented lysine biosynthesis using a carrier protein in *Thermus thermophilus*** **[17]**
Makoto Nishiyama (The University of Tokyo, Japan)

9:15 – 9:30 **Three issues in research of *Thermus thermophilus*** **[18]**
Koyu Hon-Nami (MITILS, Japan)

Session 9: Frontier Biology (1)
(Session Chair: Akihiko Yamagishi)

9:30 – 9:45 **Dissection of the ATP-dependent conformational change cycle of a group II chaperonin** **[19]**
Masafumi Yohda (Tokyo Univ. of Agricul. & Technol. Japan)

9:45 – 10:00 **XFEL Diffractive Bio-Imaging at SACLA/SPring-8** **[20]**
Yoshitaka Bessho (Academia Sinica, Taiwan)

10:00 – 10:30 **Short Break**

Session 10: Frontier Biology (2)
(Session Chair: Masasuke Yoshida)

10:30 – 11:00 **Structure and Mechanism of V type ATP synthase from *Thermus thermophilus*** **[21]**
Ken Yokoyama (Kyoto Sangyo University, Japan)

Session 11: Synthetic Biology
(Session Chair: Makoto Nishiyama & Gen-ichi Sampei)

11:00 – 11:15 **In vitro reconstitution of synthetic metabolic pathways with thermophilic enzymes** **[22]**
Kohsuke Honda (Osaka University, Japan)

11:15 – 11:30 **Artificial thermostable NADP-dependent D-amino acid dehydrogenases: creation and application** **[23]**
Toshihisa Ohshima (Osaka Institute of Technology, Japan)

Session 12: Origin, Evolution and Adaptation of Life

(Session Chair: Kei Yura & Gota Kawai)

11:30 – 11:45 **Morphological Changes of Giant Vesicle-based Model Protocell Containing dsDNA with Deferent Length** **[24]**
Tadashi Sugawara (Kanagawa University, Japan)

11:45 – 12:00 **From *Thermus thermophilus* to Astrobiology** **[25]**
Akihiko Yamagishi (Tokyo Univ. of Pharm. & Life Sci. Japan)

12:00 – 12:15 **Taking Photographs of All Members**

12:15 – 12:30 **Moving to "Mine-Onsen Fountain Park" (by bus)**

12:30 – 13:30 **Lunch**

14:00 – **Observation of Mine Hot Spring**

"SPECIAL LECUTURE" by Prof. Tairo Oshima

Poster Presentation Award, etc.

Closing Remarks

16:00 **Moving to "JR Kawazu Station" (by bus)**

Poster Presentation List [31-64]

[31] Motofumi Saito (Keio University)
Biochemical characterization of a novel and thermostable polynucleotide kinase Clp1 in the thermophilic bacterium *Thermus scotoductus*

[32] Hironori Taniguchi (Osaka University)
NAD^+ salvage pathway and its contribution to survival of *Thermus thermophilus* at high temperatures

[33] Ayano Sakai (Keio University)
Reconstitution of *in vitro* pre-tRNA splicing system in archaea and bioinformatics analysis of a putative RNA-regulating protein PF1614

[34] Soichiro Nakayama (The University of Tokyo)
Identification of the putative cysteine synthase from *Hydrogenobacter thermophilus* TK-6 as O-phospho-L-serine sulfhydrylase

[35] Yohei Hanatani (Osaka University)
In vitro production of L-cysteine with thermophilic enzymes –Kinetic modeling and computer-aided optimization of enzyme loading–

[36] Ting-Juan Ye (Academia Sinica, Taiwan)
Structure and Function of membrane lipids in Thermophilic *Thermus* and *Meiothermus*

[37] Shu-Jung Lai (Academia Sinica, Taiwan)
Genome-wide survey and proteomic analysis of *Meiothermus taiwanensis* WR220

[38] Chai-Yi Lin (Academia Sinica, Taiwan)
The discovery of novel heat-stable keratinases from *Meiothermus taiwanensis* WR-220 and its potential industrial application

[39] Ying Yang (Kyowa-kako Co. Ltd.)
Isolation of an extreme thermophile, *Thermus thermophilus* from high temperature compost

[40] Maina Otsu (Chiba Institute of Technology)
RNomics of *Thermus thermophilus* HB8.

[41] Yuri Aoki (Chiba Institute of Technology)
Expression analysis of small RNA from *Thermus thermophilus*.

[42] Aoba Ogawa (Chiba Institute of Technology)
Structure of *Thermus thermophilus* thymidylate synthase, Thy1, having an extra C terminal domain

[43] **Kyoka Shibata** (Tokyo University of Agriculture and Technology)
Structure and dynamics of Hsp104 from *Chaetomium thermophilum* and the molecular insights into the protein disaggregation mechanism.

[44] **Masao Inoue** (Kyoto University)
Phylogenetic diversity of anaerobic carbon monoxide dehydrogenase, an ancient enzyme in carbon fixation and energy conservation.

[45] **Koji Hongo** (Chiba Institute of Technology)
Analysis of a hypothetical protein YmjA, which is predicted to be related to Putrescine utilization pathway in *Escherichia coli*

[46] **Kaori Suzuki** (Chiba Institute of Technology)
Analysis of phospholipid synthases in halophilic archaea

[47] **Keita Sakurai** (Chiba Institute of Technology)
Functional analysis of fatty acid synthase homologs in thermoacidophilic archaea

[48] **Takahiro Shimosaka** (Kyoto University)
Identification of dephospho-CoA kinase in *Thermococcus kodakarensis* and elucidation of the entire CoA biosynthesis pathway

[49] **Ayako Yoshida** (The University of Tokyo)
Regulatory mechanisms of short-chain CoA transferase from *Thermus thermophilus* mediated by protein acetylation and protein-protein interaction

[50] **Takeo Tomita** (The University of Tokyo)
Allosteric regulation of glutamate dehydrogenase from *Thermus thermophilus*

[51] **Yoshinori Koyama** (alpha2bio.com)
Development of genetic engineering systems in *Thermus thermophilus*

[52] **Takahiro Yoshii** (Kyowa-kako Co. Ltd.)
Study on *Thermus thermophilus* in high temperature aerobic compost

[53] **Akio Takénaka** (Chiba Institute of Technology)
The 50th anniversary of *Thermus thermophilus* discovery. A gallery of protein structures.

[54] **Toshiyuki Moriya** (Kyowa-kako Co. Ltd.)
Thermus thermophilus exists not only in hot springs but also in compost

[55] **Fumiaki Tomoike** (Nagoya University)
Nucleoside salvage pathways in *Thermus thermophilus*

[56] **Wakao Fukuda** (Kwansei-Gakuin University)
Effect of branched-chain polyamine on gene expression in the hyperthermophilic archaeon *Thermococcus kodakarensis*

[57] **Naoyuki Kondo** (Kansai Medical University)
Thermus proteins as versatile tools for detailed analysis functionally unknown protein and efficient protein production

[58] **Haruo Shimada** (Tokyo University of Pharmacy and Life Sciences)
Analyzing the thermally stable polar lipid membrane of *Thermus thermophilus* HB-27

[59] **Shin-ichi Yokobori** (Tokyo University of Pharmacy and Life Sciences)
Quest for ancestors of eukaryotic cells; Implications from evolution of aminoacyl tRNA synthetases

[60] **Sohsuke Ohno** (Chiba Institute of Technology)
The Biopause Project: Scientific Balloon Experiments for Sampling Stratospheric Bioaerosol

[61] **Toshifumi Sakaguchi** (Prefectural University of Hiroshima)
Possibility of biogenic semi-conductive material production by mesophilic and thermophilic bacteria

[62] **Gen-ichi Sampei** (The University of Electro-Communications)
Gene organizations and their regulation in the nucleotide biosynthetic pathway

[63] **Kazuo Harada** (Tokyo Gakugei University)
RNA-directed amino acid coupling as a model for primitive translation

[64] **Akio Ebihara** (Gifu University)
Crystal structures of *S*-adenosyl-L-methionine hydroxide adenosyltransferase from thermophiles: shedding light on S_N2-substitution reaction catalyzed by an enzyme