Abstracts of papers presented
at the 2026 Cold Spring Harbor Asia Conference

SYNTHETIC BIOLOGY

November 2–November 7, 2026

Arranged by

Junbiao Dai, *Agricultural Genomics Institute at Shenzhen, CAAS*
John Glass, *J. Craig Venter Institute*
Anne Osbourn, *John Innes Centre*

Cold Spring Harbor Conferences Asia
Cold Spring Harbor Laboratory

SYNTHETIC BIOLOGY
Monday, November 2 – Friday, November 7, 2026

Monday	7:00 pm	**1** Keynote Session
Tuesday	9:00 am	**2** Synthetic Chassis
Tuesday	2:00 pm	**Poster Session**
Tuesday	7:00 pm	**3** Syn Genome
Wednesday	9:00 am	**4** SynBio Tech
Wednesday	1:30 pm	*Visit to Old Suzhou*
Wednesday	7:00 pm	**5** Policy
Thursday	9:00 am	**6** Plant Synbio
Thursday	2:00 pm	**7** Biomanufacturing
Thursday	5:00 pm	*Cocktails and Banquet*
Friday		*Departure*

Oral presentation sessions are located in the CSHA Auditorium
Poster session is in the Lake Front Hall.
Cocktail social hour is held in the CSHA lobby
Old Suzhou visits depart from the CSHA lobby
**optional tour requires additional fee.*

Meal locations and times are as follows:
Lunch: Main Cafeteria 12:00am - 1:30pm
Dinner: Main Cafeteria 6:00pm - 7:30pm
Banquet: Suz Garden 6:00 pm

More information will be available at CSHA office.
(Map at the end of this abstract book)

PROGRAM

MONDAY, November 2—7:00 PM

SESSION 1 KEYNOTE SESSION

Chairperson: **Junbiao Dai,** Agricultural Genomics Institute at Shenzhen, Shenzhen, China

John Glass. [35'+10']
J. Craig Venter Institute, La Jolla, California.

Harnessing plant metabolic diversity for food and health applications
Anne E. Osbourn. [35'+10']
John Innes Centre, Norwich, United Kingdom. 1

TUESDAY, November 3—9:00 AM

SESSION 2 SYNTHETIC CHASSIS

Chairperson: **Nozomu Yachie,** University of British Columbia, Vancouver, Canada

Reconstructing mammalian developmental cell trajectories
Nozomu Yachie. [20'+5']
Presenter affiliation: University of British Columbia, Vancouver, Canada; University of Osaka, Osaka, Japan. 2

Construction of functional artificial cells
Xiaojun Han. [20'+5']
Presenter affiliation: Harbin Institute of Technology, Harbin, China. 3

A mirror-image exonuclease enables enzymatic degradation and direct sequencing of L-DNA aptamers
Min Wang, Ping Yang, Jiahui Tian, Wen Ma, Ji Chen. [20'+5']
Presenter affiliation: Peking University-Yunnan Baiyao International Medical Research Center, Beijing, China. 4

Writing a centromere onto random DNA in moss—From hierarchical assembly to an excised minichromosome
Viktoria Petrova, Dejan Andrejic, Tobias Finkenrath, Samira Steins, Sarah Otto, Leonie Spanier, Cristina Mari-Carmona, Josepha Grewer, Uriel Urquiza-Garcia. [20'+5']
Presenter affiliation: Düsseldorf University, Düsseldorf, Germany; Cluster of Excellence on Plant Sciences, Düsseldorf, Germany. 5

Break

Engineering bacterially derived minicells for targeted cancer therapy
Barbara Di Ventura. [20'+5']
Presenter affiliation: University of Freiburg, Freiburg, Germany. 6

DeepD enables efficient genome modeling and controllable long-context sequence generation across domains of life
Beibei Xin, Zijian Wang, An Yu, Ziyang Chen, Yucheng Guo, Hainan Zhao, Jinsheng Lai. [10'+5']
Presenter affiliation: China Agricultural University, Beijing, China. 7

Programming embryogenesis using CRISPR-based epigenome editing
Ali Shariati. [10'+5']
Presenter affiliation: University of California, Santa Cruz, Santa Cruz, California. 8

Targeted epigenomic modifications enable assembly and maintenance of large repetitive DNA
Yali Cui, Yuqi Wang, Yi Wu. [10'+5']
Presenter affiliation: Tianjin University, Tianjin, China. 9

TUESDAY, November 3—2:00 PM

POSTER SESSION

Rewiring a methanol-responsive regulatory system improves glucose–methanol co-utilization in Eubacterium limosum
Jiyun Bae, Hyunwoo Jung, Seulgi Kang, Chanho Park, Donghwi Lee, Sangrak Jin, Byung-Kwan Cho.
Presenter affiliation: Korea Advanced Institute of Science and Technology, Daejeon, South Korea. 10

Toward the complete assembly of the *Schizosaccharomyces pombe* genome in *Saccharomyces cerevisiae*
Song Bai, Jiajun Ma, Zhenzhen Ma, Xinyi Zhang, Yi Wu, Yingjin Yuan.
Presenter affiliation: State Key Laboratory of Synthetic Biology, Tianjin, China; Frontiers Science Center for Synthetic Biology and Key Laboratory of Systems Bioengineering (Ministry of Education), Tianjin, China; School of Synthetic Biology and Biomanufacturing, Tianjin, China. 11

Computational architecture for synthetic genome engineering and assembly via virtualized quantum random-access memory (QuRAM) algorithms
Deborah Bambil, Patricia V. Pascoal, Rayane N. Lima, Luisa M.A. Tacca, Marco A. Oliveira, Yicheng Huang, Junbiao Dai, Elibio Rech.
Presenter affiliation: Brazilian Agricultural Research Corporation (Embrapa), Brasília, Brazil; Agricultural Genomics Institute at Shenzhen, Shenzhen, China; Federal Institute of Brasília (IFB), Brasília, Brazil. 12

Modular ribosomal protein mixture platform enables programmable 30S ribosome reconstitution and engineering
Tyng-Syuan Chang, Keiko Masuda, Yoshihiro Shimizu.
Presenter affiliation: RIKEN, Kobe, Hyogo, Japan; The University of Osaka, Osaka, Japan. 13

Targeted epigenomic modifications enable assembly and maintenance of large repetitive DNA
Yali Cui, Yuqi Wang, Yi Wu.
Presenter affiliation: Tianjin University, Tianjin, China. 14

Synthetic reconstruction of the eukaryotic 40S ribosome subunit for function dissection and expansion
Xin Hu, Aotian Cui, Guanghou Zhao.
Presenter affiliation: Northwestern Polytechnical University, Xi,an, China. 15

Decoupling phage infectivity from native receptors—Orthogonal tether engineering for programmable host recognition in bacteriophage t4
Boshuo Jian, Aung Khine Linn, Julius Fredens.
Presenter affiliation: Yong Loo Lin School of Medicine, Singapore. 16

Adaptive laboratory evolution enables autotrophic growth of *Eubacterium limosum* under defined medium conditions
Seulgi Kang, Jiyun Bae, Donghwi Lee, Hyunwoo Jung, Yoseb Song, Sangrak Jin, Byung-Kwan Cho.
Presenter affiliation: Korea Advanced Institute of Science and Technology, Daejeon, South Korea. 17

Heterologous biosynthesis of aureothin using a systematically engineered streptomyces chassis platform
Woori Kim, Jihoon Woo, Gahyeon Kim, Yongjae Lee, Hyeseong Kim, Chanyoung Joung, Donghyuk Kim, Byung-Kwan Cho.
Presenter affiliation: Korea Advanced Institute of Science and Technology, Daejeon, South Korea. 18

Advancing a phage–bacterium platform toward programmable evolution of large genetic systems
Shuxuan Lao, Shujian Ong, Pramila Ghode, Tobias V. Eden, Ashvinath Narenderan, Julius Fredens.
Presenter affiliation: National University of Singapore, Singapore. 19

A synthetic genomic platform to study tRNA biology in mammalian cells
Ana Queiroz, Joshua James, Patrick Cai.
Presenter affiliation: The University of Manchester, Manchester, United Kingdom. 20

DptE-directed evolution by multi-locus gene editing technology for enhancing daptomycin biosynthesis
Xinpeng Liu, Xu Li, Yun Wu, Fangjun Liu, Shufang Liang.
Presenter affiliation: Sichuan University, Chengdu, China. 21

In vitro reconstituted translation system integrating purified components from JCVI-syn3.0 and *Escherichia coli*
*H*aruto Miyajima, Shigeyuki Kakizawa, Keiko Masuda, Yoshihiro Shimizu.
Presenter affiliation: RIKEN Center for Biosystems Dynamics Research, Kobe, Japan; The University of Osaka, Osaka, Japan. 22

Synthetic yeast genome SCRaMbLEing uncovers a new role for ribosomal proteins in genetic code expansion
James E.J. Sanders, Stefan A. Hoffmann, Ewan R. Moody, Kathleen Cain, Mark M. McCullough, Anthony P. Green, Yizhi Cai.
Presenter affiliation: Manchester Institute of Biotechnology, Manchester, United Kingdom. 23

Optimizing biolistic transformation of *Physcomitrium patens* for short and large construct delivery
Patricia V. Pascoal, Jie Qingyu, Hao Ye, Elibio Rech, Junbiao Dai.
Presenter affiliation: Agricultural Genomics Institute at Shenzhen (AGIS), Shenzhen, China. 24

Establishing *Vibrio natriegens a*s a high-performance host for acetate-based poly-3-hydroxybutyrate production
Roland J. Politan, Simona Della Valle, Luke Pineda, Jitendra Joshi, Christian Euler, Gavin Flematti, Georg Fritz.
Presenter affiliation: The University of Western Australia, Perth, Australia. 25

YeastFab 2.0, an integrated platform for large-scale promoter library generation and high-throughput expression profile
Leandro V. Santos, Mark McCullough, Stefan Hoffmann, Patrick Y. Cai.
Presenter affiliation: University of Manchester, Manchester, United Kingdom. 26

SLEND—A label-free, ultrasensitive method for dissociation constant determination in aptamer discovery
Jia Hui. Tian.
Presenter affiliation: Peking University, Beijing, China. 27

Engineering ribosomal DNA in mammalian genomes using synthetic genomic approaches
Zi Wang, Joshua S. James, Wei Leong Chew, Patrick Cai.
Presenter affiliation: The University of Manchester, Manchester, United Kingdom; Agency for Science, Technology and Research, Singapore. 28

In vitro nuclear reconstitution unveils a conserved chromatin compartmentalization
Zirong Wang, Xiaohua Shen.
Presenter affiliation: Tsinghua University, Beijing, China. 29

Engineering a prokaryotic split bridge RNA reporter for programmable ISCro4 recombination
Yichun Weng.
Presenter affiliation: Tongji University, Shanghai, China. 30

Programmable DNA-guided strand cleavage cascades for rapid and sensitive nucleic acid detection
Yeling Yang, Guobin Mao, Junbiao Dai, Yingxin Ma.
Presenter affiliation: Shenzhen Institute of Advanced Technology, Chinese Academy of Sciences, Shenzhen, China. 31

YAC-based construction and cross-species delivery of potato artificial chromosome
Yizhou Yang, Junbiao Dai.
Presenter affiliation: Chinese Academy of Agricultural Sciences, Shenzhen, China. 32

Design principles for streamlined human chromosome synthesis—A Y-chromosome proof of concept
Puying Zhao, Shijun Zhao, Peishuang Chen, Luan Wen, Junnan Lu, Xianglin Zhang, Shuangying Jiang, Guobin Mao, Zhibin Wang, Xiaowo Wang, Yingxin Ma, Junbiao Dai.
Presenter affiliation: Shenzhen Institute of Advanced Technology, Shenzhen, China. 33

Engineering *Yarrowia lipolytica* through compartmentalized MVA pathway reconstruction for high-titer squalene production
Ziyue Zhou, Yunying Zhao, Yu Deng.
Presenter affiliation: Jiangnan University, WuXI, China. 34

TUESDAY, November 3—7:00 PM

SESSION 3 SYN GENOME

Chairperson: **Yuling Jiao,** Peking University, Beijing, China

Writing plant genomes—Toward synthetic chromosomes in plants
Yuling Jiao. [20'+5']
Presenter affiliation: Peking University, Beijing, China. 35

Exploring genome organization and genetic disorders with synthetic genomics
Yu Zhao. [20'+5']
Presenter affiliation: Westlake University, Hangzhou, China. 35

The risks of mirror life—The global discussion and the path ahead
Jolien Sweere. [20'+5']
Presenter affiliation: Mirror Biology Dialogues Fund, Austin, Texas. 37

Engineering an essential gene neochromosome in *Saccharomyces cerevisiae*
*W*arren Ho, Leandro V. dos Santos, Conrad A. Nieduszynski, Yizhi Cai. [10'+5']
Presenter affiliation: Manchester Institute of Biotechnology, Manchester, United Kingdom. 38

Towards a 19-amino-acid eukaryote
Shuangying Jiang, Junbiao Dai. [10'+5']
Presenter affiliation: Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, Shenzhen, China. 39

SESSION 4 SYNBIO TECH

Chairperson: **Yizhi Cai,** The University of Manchester, Manchester, United Kingdom

Engineering biocontainment for synthetic biology
Yizhi Cai. [20'+5']
Presenter affiliation: The University of Manchester, Manchester, United Kingdom. 40

Toward fully defined ribosome biogenesis in a cell-free system
Yoshihiro Shimizu. [20'+5']
Presenter affiliation: RIKEN, Kobe, Japan. 41

Microbe-based chromosome engineering for higher eukaryotes
Xiaoli Xue, Zhongjun Qin. [20'+5']
Presenter affiliation: Shanghai Jiao Tong University, Shanghai, China. 42

Break

LUSTIGE, light responsive *Ustilago maydis g*ene expression
Kun Tang, Micail D. Müller, Matias D. Zurbriggen. [20'+5']
Presenter affiliation: College of Life Science and Technology, Huazhong University of Science and Technology, Wuhan, China; Institute of Synthetic Biology, University of Düsseldorf, Düsseldorf, Germany. 43

A cuffed CRISPR guide RNA for microRNA activity-dependent genome editing
Arman Adel, Nozomu Yachie. [10'+5']
Presenter affiliation: The University of British Columbia, Vancouver, Canada. 44

Scaling pooled gene assembly with combinatorial bead barcoding
Nicholas Mateyko, Calin Plesa, Carl de Boer. [10'+5']
Presenter affiliation: University of British Columbia, Vancouver, Canada. 45

Learning promoter and enhancer grammar from megascale random and genomic libraries
Shreya Saha, Dan Zhang, Jussi Taipale. [10'+5']
Presenter affiliation: The Wellcome Sanger Institute, Cambridge, United Kingdom. 46

WEDNESDAY, November 4—1:30 PM

Visit to Old Suzhou

WEDNESDAY, November 4—7:00 PM

SESSION 5 POLICY

Chairperson: **Joy Zhang,** University of Kent, Canterbury, United Kingdom

An odyssey across the distance between science and society
Joy Y. Zhang. [20'+5']
Presenter affiliation: University of Kent, Canterbury, United Kingdom. 47

Anticipating synthetic biology—Building readiness in multilateral governance
Sophie P.R. Gilbert. [20'+5']
Presenter affiliation: The Geneva Science and Diplomacy Anticipator (GESDA), Geneva, Switzerland. 48

Machine learning–guided engineering of yeast eRF1
Li Cheng, Junbiao Dai. [20'+5']
Presenter affiliation: Shenzhen Institutes of Advanced Technology, Shenzhen, China; Agricultural Genomics Institute at Shenzhen, Shenzhen, China. 49

From technical possibility to meaningful impact—Engineering biology in the Anthropocene
Claudia E. Vickers.
Presenter affiliation: Queensland University of Technology, Brisbane, Australia; BioBuilt Solutions, Brisbane, Australia. 50

SESSION 6 PLANT SYNBIO

Chairperson: **Yuzhong Liu,** The Scripps Research Institute, La Jolla, California, USA

Biosynthesis of natural and new-to-nature saponins in engineered yeast
Yuzhong Liu. [20'+5']
Presenter affiliation: The Scripps Research Institute, La Jolla, California. 51

Engineering biological nitrogen fixation for agricultural benefit
Ray Dixon. [20'+5']
Presenter affiliation: John Innes Centre, Norwich, United Kingdom. 52

REvoDesign—Data-driven and structure-guided protein design for natural product biosynthesis
Yi Shang. [20'+5']
Presenter affiliation: Engineering Research Center for Valorization of Unique Bio-Resources in Yunnan, Ministry of Education, Kunming, China. 53

Break

Engineering plant chassis for natural product discovery and biosynthesis
Ancheng Huang. [20'+5']
Presenter affiliation: Southern University of Science and Technology, Shenzhen, China. 54

Discovery of a novel isoflavone biosynthetic pathway in Iridaceae plants
Yucheng Zhao. [10'+5']
Presenter affiliation: China Pharmaceutical University, Nanjing, China. 55

From sequence to function—Accelerating pathway discovery through an integrated high-throughput framework
Zimo Jin, YeEn Kim, Piroon Jenjaroenpun, Thidathip Wongsurawat, Codruta Ignea. [10'+5']
Presenter affiliation: McGill University, Montreal, Canada. 56

Engineering a modular synthetic chassis for reconstructing cytotoxic cell recognition and function
Hojjat Alizadeh Zeinabad, Xavier Casadevall i Solvas, Eva Szegezdi.
Presenter affiliation: KU Leuven, Leuven, Belgium; University of Galway, Galway, Ireland. 57

THURSDAY, November 5—2:00 PM

SESSION 7 BIOMANUFACTURING

Chairperson: **Guoqiang Chen,** Tsinghua University, Beijing, China

Extremophile biomanufacturing
George Guo-Qiang Chen. [20'+5']
Presenter affiliation: Tsinghua University, Beijing, China. 58

Determination of transcription regulatory network in *Streptomyces coelicolor b*y machine-learning transcriptomes analysis
Byung-Kwan Cho. [20'+5']
Presenter affiliation: Korea Advanced Institute of Science and Technology, Daejeon, South Korea. 59

Deciphering the pyrethrins biosynthetic pathway and reconstitution of Jasmolin I in *Nicotiana benthamiana a*nd *Saccharomyces cerevisiae*
Yi Li, Xiaochun Xiao, Shun Wen, Yao Zhi, Fangfang Chen, Yan Yao, Xueting Fang, Jing Yang, Ranjun Li, Denghong Yan, Kexin Liu, Qijun Jiang, Ge Yao, Kun Shen, Anwei Hou, Zixin Deng, Li Lu, Tiangang Liu. [20'+5']
Presenter affiliation: Shanghai Jiao Tong University, Shanghai, China. 60

Break

Biosynthesis of bioactive compounds in traditional Chinese medicines
Xue Qiao. [20'+5']
Presenter affiliation: Peking University, Beijing, China. 61

Engineering phosphate-controlled PHB production in *Vibrio natriegens* from renewable feedstocks
Roland J. Politan, Joshua Z. Wong, Kathyrn M. Morris, Bassey F. Bassey, Benjamin R.J. Roller, Gavin R. Flematti, Simona Della Valle, Georg Fritz. [10'+5']
Presenter affiliation: The University of Western Australia, Perth, Australia. 62

Design of specific protein inhibitors of toxin-antitoxin-mediated antiphage defense
Dia A. Ghose, Dustin Britton, Sebastian R. Swanson, Michael T. Laub, Amy E. Keating. [10'+5']
Presenter affiliation: University of Manchester, Manchester, United Kingdom; Massachusetts Institute of Technology, Cambridge, Massachusetts. 63

Pro-codon—In vivo data storage by programming the protein coding sequences
Shuangying Jiang, Wenfei Yu, Cheng Zeng, Xiaoluo Huang, Junbiao Dai. [10'+5']
Presenter affiliation: Shenzhen Key Laboratory of Synthetic Genomics, Guangdong Provincial Key Laboratory of Synthetic Genomics, State Key Labo, Shenzhen, China; University of Chinese Academy of Sciences, Beijing, China. 64

THURSDAY, November 5—5:00 PM

COCKTAILS and BANQUET

FRIDAY, November 6

Departure