

Abstracts of papers presented
at the 2024 Cold Spring Harbor Asia Conference
Awaji Japan

PREPARING FOR THE NEXT PANDEMIC: EVOLUTION, PATHOGENESIS AND THE VIROLOGY OF CORONAVIRUSES

December 2–December 5, 2024

Arranged by

Kei Sato, *The University of Tokyo*
Yunlong Cao, *Peking University*
Ravindra Gupta, *University of Cambridge*
Zhengli Shi, *Guangzhou Laboratory*
Alex Sigal, *Africa Health Research Institute*



Cold Spring Harbor Conferences Asia
Cold Spring Harbor Laboratory



**PREPARING FOR THE NEXT PANDEMIC: EVOLUTION,
PATHOGENESIS AND VIROLOGY OF CORONAVIRUSES**

Awaji, Japan

Monday, December 2 – Thursday, December 5, 2024

Monday	7:00 pm	<i>Opening Remarks</i> Keynote Speaker 1 and Oral Session 1 <i>Welcome Reception</i>
Tuesday	9:00 am	Oral Session 2
Tuesday	10:40 am	Oral Session 3
Tuesday	1:30 pm	Oral Session 4 and Sponsor Talk 1
Tuesday	3:10 pm	Oral Session 5
Tuesday	4:50 pm	Oral Session 6 and Keynote Speaker 2
Tuesday	7:30 pm	Poster Session and Mixer
Wednesday	9:00 am	Oral Session 7 and Sponsor Talk 2
Wednesday	1:30 pm	Oral Session 8
Wednesday	3:10 pm	Oral Session 9 and Sponsor Talk 3
Wednesday	5:55 pm	Oral Session 10
Wednesday	7:10 pm	<i>Cocktails and Banquet</i>
Thursday	9:00 am	Oral Session 11
Thursday	10:40 am	Oral Session 12 <i>Closing Remarks</i>

Awaji Yumebutai Conference Center

Meeting venue: Main Hall, 2nd floor of the Conference Center
Poster session: Reception Hall B Foyer, 2nd floor of Conference Center
CSHA office: Room 202

Breakfast*: Coccolare, 2nd floor of Grand Nikko Awaji
Dinner: Reception Hall B, 2nd floor of Conference Center
Lunch: Reception Hall B, 2nd floor of Conference Center
Cocktails: Cielo, 1st floor of Grand Nikko Awaji
Banquet: Stella, 1st floor of Grand Nikko Awaji

**Only available for guests staying at Grand Nikko Awaji*

PROGRAM

MONDAY, December 2—7:00 PM

Opening Remarks

Maria Van Kerkhove
World Health Organization

KEYNOTE SPEAKER 1

Introduction by: Ravindra Gupta, University of Cambridge, United Kingdom

How prepared is the world for the next pandemic?

Maria Van Kerkhove [35'+10']

World Health Organization

ORAL SESSION 1

Chairpersons: **Xiangxi Wang**, Institute of Biophysics, CAS, Beijing, China
Greg Towers, University College London, London, United Kingdom

Interpreting the evolution of SARS-CoV-2

Jesse D. Bloom [20'+5']

Presenter affiliation: Fred Hutch Cancer Center and HHMI, Seattle, Washington.

1

Post-pandemic cellular memory responses to SARS-CoV-2—Durability, breadth and cross-reactivity

Wendy A. Burgers [20'+5']

Presenter affiliation: Institute of Infectious Disease and Molecular Medicine, University of Cape Town, Cape Town, South Africa.

2

Structural basis for alterations in ACE2-receptor recognition and humoral immunity evasion by SARS-CoV-2 variants

Takao Hashiguchi, The Genotype to Phenotype Japan Consortium (G2P-, The Japanese Consortium on Structural Virology) [10'+5']

Presenter affiliation: Kyoto University, Kyoto, Japan.

3

Development of a coronavirus vaccine library targeting high-risk viruses

Gurpreet Brar, Georges Thiry, Nadia Cohen [10'+5']

Presenter affiliation: Coalition of Epidemic Preparedness Innovations, London, United Kingdom.

4

Welcome Reception

TUESDAY, December 3—9:00 AM

ORAL SESSION 2

Chairpersons: **Volker Thiel**, University of Bern, Bern, Switzerland
Alex Sigal, Africa Health Research Institute, Durban, South Africa

SARS-CoV-2 viral-host coevolution at the population level

Fanchong Jian, Jing Wang, Ayijiang Yisimayi, Weiliang Song, Xiao Niu, Sijie Yang, Yunlong Cao [20'+5']

Presenter affiliation: Peking University, Beijing, China; Changping Laboratory, Beijing, China.

5

Ongoing evolution of Middle East respiratory syndrome coronavirus (MERS-CoV) in East Africa and the Arabian Peninsula

Jordi Rodon, Ahmed M. Hassan, Barbara Mühlemann, Brian Maina Ogoti, Johanna Wildemann, Victor Riitho, Tagreed L. Al-Subhi, Victor M. Corman, Terry C. Jones, Marcel A. Müller, Samuel M. Thumbi, Esam I. Azhar, Christian Drosten [20'+5']

Presenter affiliation: Charité–Universitätsmedizin, Berlin, Germany.

6

Chronic SARS-CoV-2 infection drives viral evolution of innate immune evasion

Ann-Kathrin Reuschl, Lucy Thorne, Khadija Khan, Alex Sigal, Greg Towers, Clare Jolly [10'+5']

Presenter affiliation: University College London, London, United Kingdom.

7

Entry route-dependent cofactor usage of SARS-CoV-2

Bo Meng, Pan Liu, Wenrui Guo, Alice Chernaik, Frank McCaughan, Xiangxi Wang, Ravindra Gupta [10'+5']

Presenter affiliation: University of Cambridge, Cambridge, United Kingdom.

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TUESDAY, December 3—10:40 AM

ORAL SESSION 3

Chairpersons: **Zhengli Shi**, Guangzhou Laboratory, Guangzhou, China
Oliver Schwartz, Institut Pasteur, Paris, France

George Fu Gao [20'+5']

Presenter affiliation: Institute of Microbiology, CAS, Beijing, China.

SARS-CoV-2 chronic infection and intrahost adaptation

Bo Meng, Pan Liu, Alice Chernaik, Wenrui Guo, Frank McCaughan,
Xiangxi Wang, Ravindra Gupta [20'+5']

Presenter affiliation: University of Cambridge, Cambridge, United Kingdom.

9

The recombination paradox—Balancing error and adaptation in coronavirus evolution

Bonavita M. Cassandra, Heather L. Wells, Simon J. Anthony [10'+5']

Presenter affiliation: University of California, Davis, Davis, California.

10

Broad and protective neutralizing IGHV3-53/3-66 public antibodies against antigenically distinct SARS-CoV-2 variants

Naveenchandra Suryadevara, Seth J. Zost, John M. Powers,
Bernadeta Dadonaite, Pavlo Gilchuk, Elad Binshtein, Suzanne
Scheaffer, Luke Myers, Silvia Ravera, Lily E. Adams, Laura S. Handal,
Andrew Trivette, Robert H. Carnahan, Jesse D. Bloom, Ralph S. Baric,
Michael S. Diamond, James E. Crowe Jr. [10'+5']

Presenter affiliation: Vanderbilt University Medical Center, Nashville, Tennessee.

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TUESDAY, December 3—1:30 PM

ORAL SESSION 4

Chairpersons: **Kei Sato**, The University of Tokyo, Tokyo, Japan
David Robertson, University of Glasgow, Scotland,
United Kingdom

Revealing the ancient origins, evolution and emergence of coronaviruses

Edward C. Holmes [20'+5']

Presenter affiliation: University of Sydney, Sydney, Australia.

12

Targeting coronaviruses by spotlighting translation

Volker Thiel [20'+5']

Presenter affiliation: University of Bern, Bern, Switzerland.

13

Susceptibility screening and transcriptomic analyses identify potential intermediate hosts for SARS-CoV-2

Arianna M. Hurtado-Monzon, Reema Singh, Stephanie Saundh, Zeineb M'Hamdi, AmirHossein RoodDehghan, Oluwaseyi Ajagbe, Angela L. Rasmussen [10'+5']

Presenter affiliation: University of Saskatchewan, Saskatoon, Canada.

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SPONSOR TALK 1

TSINGKE [20'+5']

TUESDAY, December 3—3:10 PM

ORAL SESSION 5

Chairpersons: **Leo Poon**, The University of Hong Kong, Hong Kong, China
Stefan Pöhlmann, Georg-August-Universität Göttingen, Göttingen, Germany

Shuffling the deck—How viral EndoU shapes SARS-CoV-2 recombination

Vineet D. Menachery [20'+5']

Presenter affiliation: Emory University, Atlanta, Georgia.

15

Getting ahead of SARS-CoV-2 variants

Melanie M. Ott [20'+5']

Presenter affiliation: Gladstone Institutes, San Francisco, California.

16

Changes in viral entry pathway preference across SARS-CoV-2 variants

Julie Boucau, Owen T. Glover, Amy K. Barczak [10'+5']

Presenter affiliation: Massachusetts General Brigham, Ragon Institute of Mass General Brigham, MIT and Harvard, Cambridge, Massachusetts.

17

Recombination as a key mechanism of MERS and MERS-related coronavirus emergence and their pandemic potential

Jarel Elgin M. Tolentino, Spyros Lytras, Jumpei Ito, Kei Sato [10'+5']

Presenter affiliation: The University of Tokyo, Tokyo, Japan; Graduate School of Frontier Sciences, Kashiwa, Japan.

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TUESDAY, December 3—4:50 PM

ORAL SESSION 6

Chairpersons: **Stanley Perlman**, University of Iowa, Iowa City, Iowa, USA
Melanie Ott, University of California, San Francisco, San Francisco, California, USA

Metabolic aging drives SARS-CoV-2 infection

Peter James Mullen [10'+5']

Presenter affiliation: University of Southern California, Los Angeles, California.

19

A protein language model for exploring viral fitness landscapes

Jumpei Ito, Adam Strange, Wei Liu, Gustav Joas, Spyros Lytras, Kei Sato [10'+5']

Presenter affiliation: The Institute of Medical Science, The University of Tokyo, Tokyo, Japan.

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KEYNOTE SPEAKER 2

Emerging virus threat potential and global preparedness

Ralph S. Baric [35'+10']

University of North Carolina at Chapel Hill, Chapel Hill, North Carolina.

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TUESDAY, December 3—7:30 PM

POSTER SESSION and MIXER

Stabilization of the native conformation of class I viral fusion proteins by destabilizing the postfusion six-helix bundle

Debajyoti Chakraborty, Randhir Singh, Raghavan Varadarajan

Presenter affiliation: Indian Institute of Science, Bangalore, Karnataka, India.

22

Mechano-shaped adaptation of SARS-CoV-2 spike

Wei Chen

Presenter affiliation: Zhejiang University, Hangzhou, China.

23

Exploring the role of SAMHD1 in regulating SARS-CoV-2 infection and innate immunity

Pak Hin Hinson Cheung, Brajesh K. Singh, Constanza Espada#, Patrick Sinn, Li Wu

Presenter affiliation: Carver College of Medicine, The University of Iowa, Iowa City, Iowa.

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Respiratory syncytial virus antibody repertoire

Jie Deng, Yixing Li, Hui Zhai, Jinyue Wang, Rui Feng, Yunlong Cao, Enmei Liu, Xiangxi Wang

Presenter affiliation: Institute of Biophysics, Chinese Academy of Sciences, Beijing, China.

25

Virological characteristics of a SARS-CoV-2-related bat coronavirus, BANAL-20-236, using human organoid systems and hamster model

Shigeru Fujita, Arnon Plianchaisuk, Sayaka Deguchi, Hayato Ito, Naganori Nao, Lei Wang, Izumi Kida, Keiya Uriu, Daichi Yamasoba, The Genotype to Phenotype Japan (G2P-Japan) consortium, Jumpei Ito, Terumasa Ikeda, Shinya Tanaka, Keita Matsuno, Takasuke Fukuhara, Kazuo Takayama, Kei Sato

Presenter affiliation: The University of Tokyo, The Institute of Medical Science, Tokyo, Japan.

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Modeling SARS-CoV-2 infection-mediated airway epithelial-endothelial barrier disruption using the airway-on-a-chip

Rina Hashimoto, Masaki Yamamoto, Yasushi Fujio, Takuya Yamamoto, Miki Nagao, Yoshiaki Okada, Kazuo Takayama

Presenter affiliation: Kyoto University, Kyoto, Japan.

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Coronaviruses exploit a host cysteine-aspartic protease for efficient replication

Yuxin Hou, Hin Chu, Kwok-Yung Yuen

Presenter affiliation: Guangzhou Laboratory, Guangzhou, China.

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Host determinants for the differential tropism and pathogenicity of seasonal and highly pathogenic coronaviruses

Bingjie Hu, Yixin He, Madeline Hartnoll, Huan Liu, Feifei Liu, Yuenchen Liu, Hin Chu

Presenter affiliation: The University of Hong Kong, Hong Kong, China.

29

- A generalized framework to identify SARS-CoV-2 broadly neutralizing antibodies via accurate viral evolution prediction**
Fanchong Jian, Anna Z. Wec, Leilei Feng, Xiangxi Wang, Laura M. Walker, Yunlong Cao
 Presenter affiliation: Peking University, Beijing, China; Changping Laboratory, Beijing, China. 30
- Virological features of SARS-CoV-2 Omicron JN.1 descendants including currently the most prevalent variant, KP.3, and its derivative, KP.3.1.1**
Yu Kaku, Keiya Uriu, Yusuke Kosugi, The Genotype to Phenotype Japan (G2P-Japan) Consortium, Jumpei Ito, Kei Sato
 Presenter affiliation: The University of Tokyo, The Institute of Medical Science, Tokyo, Japan 31
- Exploring antigenic evolution by embedding viral protein sequences into antigenic cartography using a protein language model**
Shusuke Kawakubo, Jumpei Ito, Adam Strange, Spyros Lytras, Kei Sato
 Presenter affiliation: The University of Tokyo, Tokyo, Japan. 32
- Advances and challenges in using genome-based machine learning for virus infectivity prediction**
Junna Kawasaki, Tadaki Suzuki, Michiaki Hamada
 Presenter affiliation: Chiba University, Chiba, Japan; Waseda University, Tokyo, Japan; National Institute of Infectious Diseases, Tokyo, Japan. 33
- Severe disease is not essential for a high neutralizing antibody response post-SARS-CoV-2 infection**
Afrah Khairallah, Zesuliwe Zesuliwe Jule, Alice Piller, Mallory Bernstein, Kajal Reedoy, Yashica Ganga, Bernadett I Gosnell, Farina Karim, Yunus Moosa, Thumbi Ndung'u, Khadija Khan, Alex Sigal
 Presenter affiliation: Africa Health Research Institute, Durabn, South Africa. 34
- Induction of broadly neutralizing IGHV3-53 public antibodies against SARS-CoV-2 in a Delta breakthrough infection case**
Takeo Kuwata, Yu Kaku, Shashwata Biswas, Kaho Matsumoto, Ahmed K. Edri, Takao Hashiguchi, Takeshi Noda, Kyo Okazaki, Rumi Minami, Yoji Nagasaki, Kenji Sadamasu, Kazuhisa Yoshimura, Terumasa Ikeda, Kei Sato, Hiroshi Morioka, Shuzo Matsushita
 Presenter affiliation: Kumamoto University, Kumamoto, Japan. 35

An end-to-end nasal organoid toolset to study coronavirus-host interactions	
<u>Julie T. Chu</u> , Marcus G. Mah, Gavin J. Smith, <u>Mart M. Lamers</u>	
Presenter affiliation: Duke-NUS Medical School, Singapore.	36
The origin of SARS-CoV-2 and its furin cleavage site, a new and parsimonious evolutionary model	
<u>Jonathan R. Latham</u> , Allison K. Wilson	
Presenter affiliation: Bioscience Resource Project, Ithaca, New York.	37
Sequential intranasal booster triggers class switching from intramuscularly primed IgG to mucosal IgA against SARS-CoV-2	
<u>Yifan Lin</u> , Xuejiao Liao, Xuezhi Cao, Zhaoyong Zhang, Xiuye Wang, Xiaomeng He, Huiping Liao, Bin Jiu, Furong Qi, Hairong Xu, Zhenhua Ren, Yanqun Wang, Yang-Xin Fu, Jincun Zhao, Zheng Zhang, Hua Peng	
Presenter affiliation: Tsinghua University, Beijing, China; Chinese Academy of Sciences, Institute of Biophysics, China.	38
Spike N354 glycosylation augments SARS-CoV-2 fitness for human adaptation through structural plasticity	
<u>Pan Liu</u> , Can Yue, Bo Meng, Tianhe Xiao, Sijie Yang, Shuo Liu, Fanchong Jian, Qianhui Zhu, Yuanling Yu, Yanyan Ren, Peng Wang, Yixin Li, Jinyue Wang, Fei Shao, Youchun Wang, Ravindra K. Gupta, Yunlong Cao, Xiangxi Wang	
Presenter affiliation: Institute of Biophysics Chinese Academy of Sciences, Beijing, China; University of Chinese Academy of Sciences, College of Life Science, China.	39
Evolutionary dynamics of SARS-CoV-2 genomes	
<u>Jian Lu</u>	
Presenter affiliation: Peking University, Beijing, China.	40
Genomic epidemiology of porcine deltacoronavirus in Cambodia	
<u>Marcus Mah</u> , Siegers Jurre, Rong Zhang, Yvonne Su, Gavin Smith, Erik Karlsson	
Presenter affiliation: Duke-NUS Medical School, Singapore.	41
Differential prolonged multiomic responses to mRNA and inactivated virus COVID-19 vaccines	
<u>Chris Ka Pun Mok</u> , Hein M Tun, Shilin Zhao, David Sc Hui	
Presenter affiliation: The Chinese University of Hong Kong, Hong Kong, China.	42

Omicron BA.5 and XBB.1.5 reduced TMPRSS2 dependency in murine upper airway

Naoko Iwata-Yoshikawa, Nozomi Shiwa-Sudo, Yusuke Sakai, Tadaki Suzuki, Makoto Takeda, Noriyo Nagata

Presenter affiliation: National Institute of Infectious Diseases, Tokyo, Japan.

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Omicron-specific ultra-potent SARS-CoV-2 neutralizing antibodies targeting the N1/N2 loop of Spike N-terminal domain

Xiao Niu, Zhiqiang Li, Jing Wang, Fanchong Jian, Weiliang Song, Ayijiang Yisimayi, Shuo Du, Zhiying Zhang, Sijie Yang, Tianhe Xiao, Youchun Wang, Junyu Xiao, Yunlong Cao

Presenter affiliation: Peking University, Beijing, China; Changping Laboratory, Beijing, China.

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Cross-neutralization of anti-MERS-CoV monoclonal antibodies against a variety of merbecoviruses

Lin Pan, Yu Kaku, Yusuke Kosugi, Kei Sato.

Presenter affiliation: The University of Tokyo, the Institute of Medical Science, Tokyo, Japan.

45

Sequential intranasal booster triggers class switching from intramuscularly primed IgG to mucosal IgA against SARS-CoV-2

Yifan Lin, Xuejiao Liao, Xuezhi Cao, Zhaoyong Zhang, Xiuye Wang, Xiaomeng He, Huiping Liao, Bin Ju, Furong Qi, Hairong Xu, Zhenhua Ren, Yanqun Wang, Yang-Xin Fu, Jincun Zhao, Zheng Zhang, Hua Peng

Presenter affiliation: Guangzhou Laboratory, Guangzhou, China; The First Affiliated Hospital of Guangzhou Medical University, Guangzhou, China, Institute of Biophysics, Chinese Academy of Sciences, Key Laboratory of Infection and Immunity, Beijing, China.

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Repeated Omicron exposures override ancestral SARS-CoV-2 immune imprinting

Ayijiang Yisimayi, Weiliang Song, Jing Wang, Fanchong Jian, Yuanling Yu, Xiaosu Chen, Xiaoliang S. Xie, Youchun Wang, Yunlong Cao

Presenter affiliation: Peking University, Beijing, China; Changping Laboratory, Beijing, China.

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Evaluation of infectious viral shedding duration for immunocompromised COVID-19 patients based on the severity of immunocompromised status

Kenichiro Takahashi, Noriko Iwamoto, Masahiro Ishikane, Naoya Itoh, Mizuki Haraguchi, Takashi Sakoh, Masayo Morishima, Naoyuki Uchida, Sho Miyamoto, Kohei Kamegai, Noriko Fuwa, Kosei Matsue, Yoshiaki Marumo, Takuya Adachi, Ryota Hase, Hideki Araoka, Norio Ohmagari, Tadaki Suzuki

Presenter affiliation: National Institute of Infectious Diseases, Tokyo, Japan.

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Reproducing viral infection-mediated inflammation and fibrosis using human respiratory organoids

Rina Hashimoto, Yukio Watanabe, Yasufumi Matsumura, Masako Yamasaki, Ai Hirabayashi, Masahiro Nakano, Sunanda Keisham, Hiroaki Tateno, Takuya Yamamoto, Takeshi Noda, Koichi Watashi, Miki Nagao, Kazuo Takayama

Presenter affiliation: Kyoto University, Kyoto, Japan.

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Adaptation of HCoV-229E to cultured cells and changes in ORF4

Makoto Takeda, Yuki Kitai, Shohei Kojima, Kazuya Shirato, Miyuki Kawase, Hideko Watabe, Sota Takahashi, Yukiko Akahori, Hiroshi Katoh, Hidekazu Nishimura

Presenter affiliation: The University of Tokyo, Bunkyo-ku, Japan.

50

Molecular insights into interaction interface of Nsp3 and Nsp4 in SARS-CoV-2 infection

Tze-Tung Tang, Pak-Hin Hinson Cheung, Dong-Yan Jin

Presenter affiliation: The University of Hong Kong, Hong Kong, China.

51

Attenuating mutations of SARS-CoV-2 and live attenuated vaccine design

Tony T. Wang

Presenter affiliation: US FDA, Silver Spring, Maryland.

52

Structural insights into the mobility of receptor binding domain in SARS-CoV-2 BA.2.86 spike protein

Hisano Yajima, Yuki Anraku, Yu Kaku, Kanako T. Kimura, Arnon Plianchaisuk, Kaho Okumura, Yoshiko Nakada-Nakura, Yusuke Atarashi, Takuya Hemmi, Daisuke Kuroda, Yoshimasa Takahashi, Shunsuke Kita, Jiei Sasaki, Hiromi Sumita, Jumpei Ito, Katsumi Maenaka, Kei Sato, Takao Hashiguchi

Presenter affiliation: Institute for Life and Medical Sciences, Kyoto University, Kyoto, Japan.

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Evopred—A deep learning approach for estimating the temporal growth trends of novel SARS-CoV-2 variants <u>Sijie Yang</u> , Xiaowei Luo, Jiejian Luo, Fanchong Jian, Yunlong Cao Presenter affiliation: Peking University, Beijing, China.	54
Polyphenol-enabled 2D Nanopatch for enhanced nasal mucoadhesion and immune activation Jeong Pil Han, Yu Ri Nam, Hye Yoon Chung, Haeshin Lee, <u>Su Cheong Yeom</u> Presenter affiliation: Seoul National University, PyeongChang, South Korea.	55
PP1-mediated dephosphorylation of the SARS-CoV-2 N protein required for viral particle assembly <u>Yanying Yu</u> , Ziqiao Wang, Rong Zhang, Qiang Ding Presenter affiliation: Tsinghua University, Beijing, China.	56
SARS-COV-2 ORF9B triggers hyperactivation of the inflammasome leading to the production of IL-1b <u>Tin Long Yuen</u> , Dong Yan Jin Presenter affiliation: University of Hong Kong, Hong Kong, China.	57
KLK13 functions as a scissor and cleaves the spike of SARS-CoV-2 <u>Guigen Zhang</u> Presenter affiliation: Sun Yat-sen University, Guangzhou, China.	58
Evolution of cross-reactivity in a public antibody clonotype targeting the SARS-CoV-2 receptor binding domain <u>Seth J. Zost</u> , Elad Binshtein, Suzanne M. Scheaffer, Bernadeta Dadonaite, Laura S. Handal, John M. Powers, Sarah R. Leist, Luke Myers, Naveenchandra Suryadevara, Silvia Ravera, Pavlo Gilchuk, Ralph S. Baric, Jesse D. Bloom, Larissa B. Thackray, Michael S. Diamond, Robert H. Carnahan, James E. Crowe Presenter affiliation: Vanderbilt University Medical Center, Nashville, Tennessee.	59

WEDNESDAY, December 4—9:00 AM

ORAL SESSION 7

Chairpersons: **Vineet Menachery**, University of Texas Medical Branch, Galveston, Texas, USA
Clare Jolly, University College London, London, United Kingdom

Neurological PASC in SARS-CoV-2-infected mice and humans

Stanley Perlman [20'+5']

Presenter affiliation: University of Iowa, Iowa City, Iowa. 60

The 3As of SARS-CoV-2 infection—ACE2, activators and antibodies

Stefan Pöhlmann [20'+5']

Presenter affiliation: German Primate Center, Göttingen, Germany. 61

Determination of the factor responsible for the host tropism of SARS-CoV or SARS-CoV-2 related coronaviruses

Yusuke Kosugi, Arnon Plianchaisuk, Spyros Lytras, Shigeru Fujita, Izumi Kimura, Jumpei Ito, Kei Sato [10'+5']

Presenter affiliation: The University of Tokyo, Tokyo, Japan. 62

The role of necroptosis in coronavirus pathogenesis

Hin Chu [10'+5']

Presenter affiliation: The University of Hong Kong, Hong Kong, China. 63

SPONSOR TALK 2

Pfizer [60']

WEDNESDAY, December 4—1:30 PM

ORAL SESSION 8

Chairpersons: **Edward Holmes**, The University of Sydney, Sydney, Australia
Ravindra Gupta, University of Cambridge, Cambridge, United Kingdom

Translating science to public health impacts

Leo Poon [20'+5']

Presenter affiliation: The University of Hong Kong, Hong Kong, China; Centre of Immunology and Infection, Hong Kong, China. 64

Evolutionary lessons from SARS-CoV-2—The potential for AI to characterise novel variants

David L. Robertson [20'+5']

Presenter affiliation: MRC-University of Glasgow Centre for Virus Research, Glasgow, United Kingdom.

65

The evolution of an antigenically distinct genotype of the human coronavirus NL63

Spyros Lytras, Jarel E. Tolentino, Keiya Uriu, Kenichi Komabayashi, Katsumi Mizuta, Tsutomu Itagaki, Jumpei Ito, Kei Sato [10'+5']

Presenter affiliation: The University of Tokyo, Tokyo, Japan.

66

Zoonotic and reverse zoonotic transmission potential of SARS-CoV-2 and its related CoVs

Xiuyuan Ou, Jiaxin Hu, Pei Li, Xiangxi Wang, Zhaohui Qian [10'+5']

Presenter affiliation: CAMS & Peking Union Medical College, Beijing, China.

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WEDNESDAY, December 4—3:10 PM

ORAL SESSION 9

Chairpersons: **George Fu Gao**, Institute of Microbiology, CAS, Beijing, China

Christian Drosten, Charité-Universitätsmedizin Berlin, Berlin, Germany

Evolution of SARS-CoV-2

Kei Sato [20'+5']

Presenter affiliation: The University of Tokyo, Tokyo, Japan.

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Entry and replication of human seasonal coronavirus HKU1

Olivier Schwartz [20'+5']

Presenter affiliation: Institut Pasteur, Paris, France.

69

Rationally designed SARS-CoV-2 modified live vaccines are safe and capable of inducing sterile immunity in Syrian hamsters

Jacob Schön, G. Tuba Barut, Bettina Salome Trüeb, Nico Halwe, Lorenz Ulrich, Claudia Wylezich, Jana Kochmann, Björn Corleis, Tobias Britzke, Angele Breithaupt, Nadine Ebert, Donata Hoffmann, Martin Beer, Volker Thiel [10'+5']

Presenter affiliation: Friedrich-Loeffler-Institut, Greifswald-Riems, Germany.

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Significance of SARS-CoV-2 viral intra-host evolution in immunocompromised COVID-19 patients

Yuichiro Hirata, Kenichiro Takahashi, Sho Miyamoto, Junna Kawasaki, Sohtaro Mine, Shun Iida, Takayuki Kanno, Harutaka Katano, Tomoya Saito, Tadaki Suzuki [10'+5']

Presenter affiliation: National Institute of Infectious Diseases, Tokyo, Japan.

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SPONSOR TALK 3

HiLung [45']

WEDNESDAY, December 4—5:55 PM

ORAL SESSION 10

Chairpersons: **Yunlong Cao**, Peking University, Beijing, China
Wendy Burgers, University of Cape Town, Cape Town, South Africa

Evolution and entry mechanism of SARS-related coronaviruses from wildlife

Zhengli Shi [20'+5']

Presenter affiliation: Guangzhou Laboratory, Guangzhou, China.

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Viral structure, antibody repertoire and vaccine design of SARS-CoV-2

Xiangxi Wang [20'+5']

Presenter affiliation: Institute of Biophysics, CAS, Beijing, China.

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Learning from the wave of COVID-19 literature

Cherilyn M. Sirois [20'+5']

Presenter affiliation: Cell Press, Cambridge, Massachusetts.

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COCKTAILS and BANQUET

ORAL SESSION 11

Chairpersons: **Jesse Bloom**, Fred Hutchinson Cancer Center, Seattle, Washington, USA
Alex Sigal, Africa Health Research Institute, Durban, South Africa

The recency and geographical origins of the bat viruses ancestral to SARS-CoV and SARS-CoV-2

Jonathan E. Pekar, Spyros Lytras, Mahan Ghafari, Andrew F. Magee, Edyth Parker, Jennifer L. Havens, Aris Katzourakis, Tetyana I. Vasylyeva, Marc A. Suchard, Alice C. Hughes, Joseph Hughes, David L. Robertson, Simon Dellicour, Michael Worobey, Joel O. Wertheim, Philippe Lemey [10'+5']
Presenter affiliation: University of Edinburgh, Edinburgh, United Kingdom.

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Establishment of a persistent SARS-CoV-2 infection model using SCID rat

Kaya Miyazaki, Nozomi Shiwa-Sudo, Naoko Iwata-Yoshikawa, Yusuke Sakai, Kazuto Yoshimi, Tomoji Mashimo, Tadaki Suzuki, Hideki Hasegawa, Noriyo Nagata [10'+5']
Presenter affiliation: National Institute of Infectious Diseases, Tokyo, Japan; Tohoku University, Tokyo, Japan.

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SARS-CoV-2 evolution of innate immune evasion

Clare Jolly, Ann-Kathrin Reuschl, Lucy Thorne, Dejan Mesner, Greg Towers [20'+5']
Presenter affiliation: University College London, London, United Kingdom.

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Does virus innate immune evasion link to pandemic threat?

Ziqi Zhou, Ann-Kathrin Reuschl, Oliver Wright, Lucy Thorne, Clare Jolly, Greg Towers [20'+5']
Presenter affiliation: University College London, London, United Kingdom.

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ORAL SESSION 12

Chairpersons: **Zhengli Shi**, Guangzhou Laboratory, Guangzhou, China
Yunlong Cao, Peking University, Beijing, China

Deciphering sarbecovirus spillovers via deep mutational scanning and predictive modeling

Jing Wang, Fanchong Jian, Xiangyang Hu, Haiyan Sun, Lijuan Zhao, Yunlong Cao [10'+5']

Presenter affiliation: Peking University, Beijing, China; Changping Laboratory, Beijing, China.

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Amino acid substitution NSP6-L260F affects the replication of SARS-CoV-2 Omicron variants

Yuri Furusawa, Kiyoko Iwatsuki-Horimoto, Seiya Yamayoshi, Yoshihiro Kawaoka [10'+5']

Presenter affiliation: National Center for Global Health and Medicine Research Institute, Tokyo, Japan; University of Tokyo, Institute of Medical Science, Tokyo, Japan.

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Pan-sarbecovirus immunity—Lessons from SARS survivors

Linfa Wang [20']

Presenter affiliation: Duke-NUS Medical School, Singapore.

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Jincun Zhao [20']

Presenter affiliation: The First Affiliated Hospital of Guangzhou Medical University, Guangzhou, China.

SARS-CoV-2 intrahost persistence—Implications for seasonality and vaccination

Alex Sigal [20'+5']

Presenter affiliation: Hebrew University of Jerusalem, Jerusalem, Israel; Africa Health Research Institute, Durban, South Africa; University of KwaZulu-Natal, Durban, South Africa.

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Closing Remarks

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