

# Tsinghua Newsletter

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Global Alliance of Universities on Climate (GAUC)  
formally established



President of the Hellenic Republic H.E. Mr. Prokopios  
Pavlopoulos visits Tsinghua



SIGS sign unveiled as part of Tsinghua's 108th Anniversary

# Global Alliance of Universities on Climate (GAUC) formally established

Tsinghua University serves as the inaugural Chair of the Alliance

On May 28th and 29th, a meeting of the executive committee and academic committee of the Global Alliance of Universities on Climate (GAUC) was held in Beijing. University leaders and academic pioneers in the field of climate change from twelve universities in six continents gathered in Tsinghua University to attend the meeting. During the meeting, the GAUC Charter was discussed and approved, and GAUC was formally established.

The member universities of the Alliance include Australian National University, the University of California Berkeley, the University of Cambridge, Imperial College London, the London School of Economics and Political Science, Massachusetts Institute of Technology, the University of Tokyo, Tsinghua University, the Federal University of Rio de Janeiro, the Indian Institute of Science, Sciences Po, and Stellenbosch University.

During the meeting, it was agreed that Tsinghua University will serve as the inaugural Chair of GAUC, and the London School of Economics and Political Science will serve as the inaugural Co-chair. President Qiu Yong of Tsinghua University will serve as the founding Chairperson of the Alliance and



Director Dame Minouche Shafik of the London School of Economics and Political Science will serve as Co-chairperson. The establishment of the Secretariat of the Alliance was

also approved during the meeting. The first Secretariat of the Alliance will be based at Tsinghua University for a term of four years, and Executive Vice President Li Zheng of



the Institute of Climate Change and Sustainable Development, Tsinghua University, will serve as the first secretary-general of GAUC.

During his meeting with delegates, President Qiu Yong of Tsinghua University noted that since the eight universities released the joint statement this January at Davos, four new members from France, India, Brazil and South Africa have joined the Alliance to work closely together on the preparation of the Alliance. “Leading universities should play a leading role in tackling the most challenging issues confronted by humankind. This initiative is very timely and meaningful for global climate governance and for coping with the challenges of climate change worldwide. Tsinghua will continue to provide our full support to the initiative,” said President Qiu.



The meeting was hosted by Vice President and Provost Yang Bin of Tsinghua University. Lord Nicholas Stern, Professor of the London School of Economics and Political Science and renowned economist on climate, and He Jiankun, Director of the Academic Committee of the Institute

of Climate Change and Sustainable Development, Tsinghua University, introduced the latest trends in global climate governance and explained the special significance of establishing a university alliance. Delegates from 12 member universities carried out in-depth discussion on the missions and vision, governance structure, development strategy, cooperation content, long-term planning and recent actions of the alliance.



In accordance with the charter approved by the Alliance, it will focus on joint research, talent cultivation,

student exchanges, green and carbon-neutral campus implementation, public engagement and other major aspects, including the strengthening of bilateral or multilateral cooperative research on key scientific, technological and economic policy issues related to climate change, economy and policy, the promotion of technological innovation and policy development, and the establishment of joint learning projects to promote exchanges and cooperation among young students around the world, and enhance public awareness and mobilize more climate change action through greater cooperation with related stakeholders.



# President of the Hellenic Republic H.E. Mr. Prokopios Pavlopoulos visits Tsinghua

On May 15th, H.E. Mr. Prokopios Pavlopoulos, President of the Hellenic Republic, made his first visit to Tsinghua University. During his visit, President Pavlopoulos delivered a speech entitled “The Contribution of the Greek Language to the Dialogue of Civilizations”.

Qiu Yong, President of Tsinghua University, had a meeting with President Pavlopoulos. The Chinese Ambassador to the Hellenic Republic Zhang Qiyue attended the meeting.

The delegation from the Hellenic Republic included Mrs. Vlassia Pavlopoulou, Spouse of HE the President of the Hellenic Republic; Mr. Terens Nikolaos Quick, Deputy Minister of Foreign Affairs of the Hellenic Republic; Mr. Georges Yennimatas, Secretary General of the Presidency of the Hellenic Republic; Mr. Leonidas Rokanas, Ambassador of the Hellenic Republic to China, and Mr. Panagiotis Laskaridis, President of the Aikaterini Laskaridis Foundation.

President Qiu welcomed President Pavlopoulos on his first visit to Tsinghua University. He emphasized the importance of dialogue between civilization and youth exchanges between the two countries. He also emphasised the hope of Tsinghua University to promote scientific and academic exchanges between the two countries.

President Pavlopoulos said that he was very honored to make his first visit to Tsinghua University. He welcomed dialogue between Greece



and China, and hoped there will be further cooperation and exchanges between universities of the two countries.

The Tsinghua Global Vision Lecture session was held following the meeting. President Pavlopoulos delivered a keynote speech entitled “The Contribution of the Greek Language to the Dialogue of Civilizations”. Tsinghua University Vice President and Provost Yang Bin moderated the event.

In his opening remarks, President Qiu welcomed President Pavlopoulos and his delegation to the beautiful campus of Tsinghua University. He stated that China and Greece are two great civilizations that have far-reaching influence in the

history of mankind. The people of the two countries has been maintaining a good relationship by showing appreciation and respect towards each other. Tsinghua University highly values its educational and cultural exchanges with universities in Greece. It is hoped that there will be more in-depth exchanges and cooperation between universities of the two countries in the future.





In his speech, President Pavlopoulos shared with the audience the concepts and ideas about the dialogue of civilizations. He highlighted the inextricable link and dialectic relations between the Greek Civilization and the Greek Language in its historical evolution. He also elaborated on the contribution of Greek Language and Greek Civilization for the communication and dialogue among great civilizations, mainly to the dialogue of the Greek Civilization with the very ancient, wonderful, ever dynamic and creative Chinese Civilization, throughout its uninterrupted history.

President Pavlopoulos stressed in his speech that every civilization is unique and authentic, and there is no ranking of civilizations where one is superior over another. He stated that it is the language that has created a civilization, and hence language is the best way to express a civilization. He believed that great civilizations are made to evolve and communicate, and every individual has to perform the duty to build bridges of communication between civilizations. It is hoped that a peaceful and creative world can be created through languages and civilizations.

After the speech, there was a Q and A session for President

Pavlopoulos to answer questions from participating students. Li Jinliang, Dean of the International Cooperation and Exchange Office; Lu Xiaobo, Dean of the Academy of Arts and Design;

Zhao Kejin, Director of Department of International Relations; Meng Bo, Associate Dean of the International Cooperation and Exchange Office, and Tsinghua students and faculty also attended the event.

# SIGS sign unveiled as part of Tsinghua's 108th Anniversary

In honor of Tsinghua's 108th Anniversary, students, faculty, staff, alumni and friends of the university gathered at its Shenzhen University Town campus on 11th May. Members of the Tsinghua community reconnected through a variety of friendly sports competitions, performances, presentations, exhibitions, and other activities celebrating Tsinghua's history and its achievements in the past year.

As part of the festivities, Tsinghua Shenzhen International Graduate School (SIGS), formally established in March, marked the beginning of a new chapter with its sign unveiling ceremony. Tsinghua SIGS CPC Committee Secretary Wu Xiaofeng presided over the ceremony, introducing the government representatives and Tsinghua leaders in attendance.

Among them was Shenzhen Vice Mayor Wang Lixin, who spoke during the ceremony. Emphasizing Tsinghua and Shenzhen's long history of cooperation—from the opening of the Research Institute of Tsinghua University in Shenzhen (RITS) in 1996, to the joint



**"A confident Tsinghua is a more open Tsinghua." Flags marking Tsinghua's 108th Anniversary are seen on the Tsinghua SIGS campus in Shenzhen University Town.**

establishment of the Graduate School at Shenzhen (GSST) in 2001, to the formation of the Tsinghua-Berkeley Shenzhen Institute (TBSI) in 2014, to the in-progress construction of a new campus extension for Tsinghua SIGS—Mr Wang restated Shenzhen Municipal Government's commitment to supporting Tsinghua SIGS as it becomes a global leader in education and research.

Tsinghua University Council Vice Chairperson Han Jingyang spoke next, commending the success of GSST and TBSI in bringing together Tsinghua's spirit of "actions speak



**From left: Tsinghua SIGS CPC Committee Secretary Wu Xiaofeng, Shenzhen Vice Mayor Wang Lixin, and Tsinghua University Council Vice Chairperson Han Jingyang speak at the Tsinghua SIGS sign unveiling.**

louder than words” and Shenzhen’s “dare to innovate” attitude. Ms Han further noted that Tsinghua SIGS will deepen collaboration between Tsinghua and Shenzhen, and serve as a new expression of both parties’ strengths in education, research, and innovation.

Following Ms Han’s speech, Mr Wu invited past and present Tsinghua leaders and local government representatives to join him, Mr Wang, and Ms Han in revealing the new sign. As the cover was pulled aside, the crowd broke into applause and cheers.

The new sign sits at Tsinghua SIGS’s south entrance. Weighing 40 tons and standing 1.95 meters tall, the sign was carved and assembled from three slabs of yellow limestone. Engravings of the Tsinghua SIGS name face the south entrance, while Tsinghua’s motto of “Self-Discipline and Social Commitment” faces



**The revealed Tsinghua SIGS sign, flanked by government representatives and Tsinghua leaders.**

inward.

Launched on 29th March 2019, Tsinghua SIGS is an expansion of GSST and TBSI. It aims to bring together world-class faculty and students, tackle global challenges through cutting-edge research and international collaboration, and nurture the next generation of global leaders by creating an International, Borderless, and Entrepreneurial

learning and research environment. By 2030, Tsinghua SIGS plans to expand to 400 faculty and 8000 full-time graduate students, with overseas talent accounting for one-third of each. Tsinghua SIGS began accepting applications to its first new degree program in April, and will welcome its first cohort of students this September.



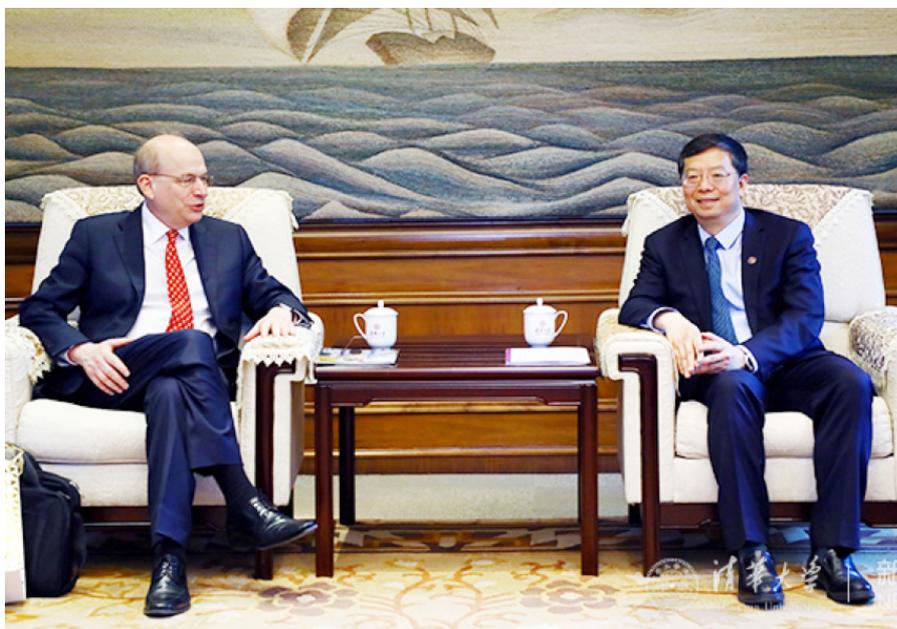
**Attendees gather in front of the Tsinghua SIGS sign for a group photo.**

# Qiu Yong meets President David Leebron of Rice University

*The two universities will jointly establish the Tsinghua University-Rice University Joint Research Center for Human Capital and Sustainable Innovation*

On the afternoon of May 20th, President David Leebron of Rice University visited Tsinghua University, President Qiu Yong met with him in Gong Ziting. The two sides held talks on further promoting cooperation between the two universities. Vice President and Provost Yang Bin attended the signing ceremony for the establishment of the Tsinghua University-Rice University Joint Research Center for Human Capital and Sustainable Innovation.

David Leebron noted that the establishment of the Tsinghua University-Rice University Joint Research Center for Human Capital and Sustainable Innovation is another important measure to expand and deepen the cooperation between the two universities. He hoped that the two sides would work together to help the research center produce more innovative research results that will be more conducive to promoting the future development of mankind.



Before the signing ceremony, Yang Bin noted in his speech that the establishment of the Joint Research Center will play an active role in promoting cooperation in human resource research, training top-notch talents, and stimulating innovative ideas.



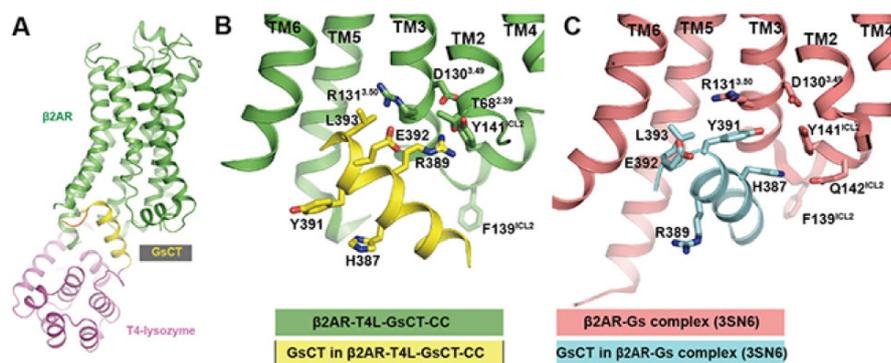
## Prof Brian Kobilka's group reported structural insights into the process of GPCR-G Protein complex formation

On 9th May 2019, Xiangyu Liu and Xinyu Xu in Professor Brian Kobilka's group in the School of Medicine, Tsinghua University, published an article entitled "Structural Insights into the Process of GPCR-G Protein Complex Formation" in the journal Cell. The paper reported an active  $\beta$ 2AR structure obtained by fusion with the C terminus peptide of the G $\alpha$ s protein (GsCT) and the structure of GDP bound Gs heterotrimer (Gs<sup>GDP</sup>). These structures provide evidence for an alternate interaction between the  $\beta$ 2AR and Gs that

may represent an intermediate that contributes to Gs coupling specificity. In the same issue of Cell, Professor Brian Kobilka's group in the School of Medicine, Stanford University, published a paper entitled "Assembly of a GPCR-G protein complex", which reports their efforts to investigate the dynamic process for GPCR-G protein complex formation using time-resolved mass spectrometry. These two papers support each other and reveal the molecular mechanism of GPCR-G Protein complex formation from different aspects.

G protein-coupled receptors (GPCRs) are the largest family of membrane receptors with more than 800 family members in the human genome. GPCRs play important roles in physiology by mediating the senses of sight, smell, taste and the responses to hormones, and neurotransmitters. They are the targets of approximately 30% of clinical drugs. The activated receptors bind to a diverse set of downstream signaling proteins including G proteins, GRKs and arrestins. An agonist bound GPCR first forms complex with guanosine diphosphate (GDP) bound G protein (GPCR-G<sup>GDP</sup>), triggers the release of GDP from G $\alpha$ , leads to the formation of a nucleotide-free complex (GPCR-G<sup>empty</sup>). Then guanosine triphosphate (GTP) binds to G protein and dissociates the complex to allow different subunits to activate downstream signaling pathways (Figure 1).

The  $\beta_2$  adrenergic receptor ( $\beta_2$ AR) has been a model system

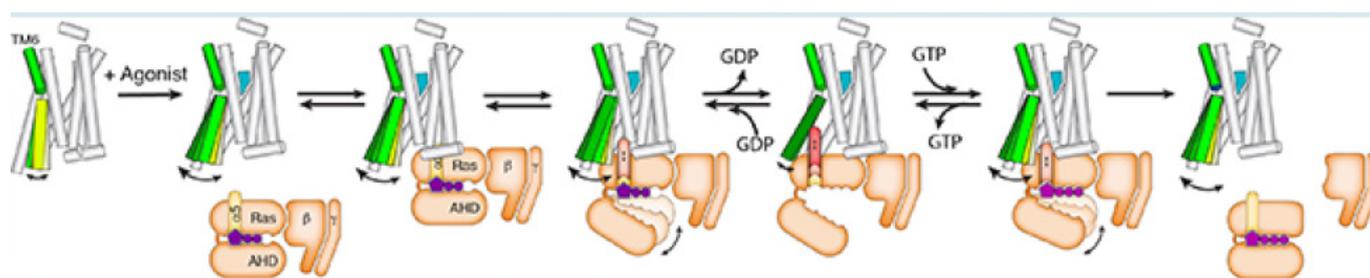


**Figure 2. Overall  $\beta_2$ AR-T4L-GsCT-CC structure and alternative interaction between GsCT and  $\beta_2$ AR compared to the  $\beta_2$ AR-Gs complex structure (3SN6).**

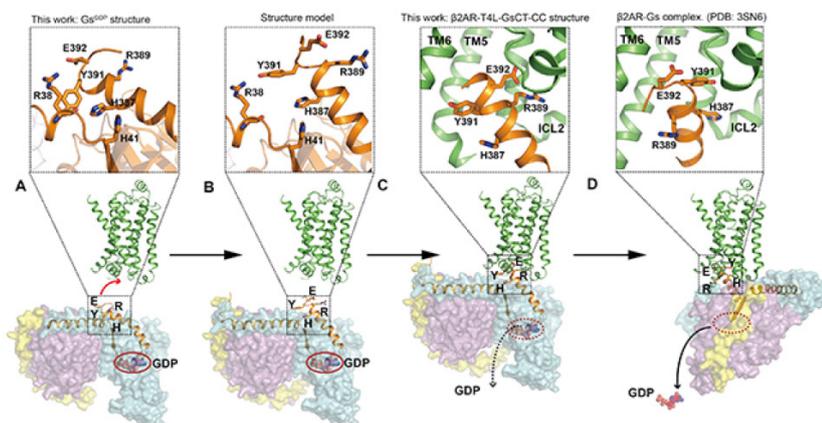
for GPCRs studies. Professor Brian Kobilka's group at Stanford University determined the inactive state  $\beta_2$ AR structure in 2007, which was the first crystal structure of a hormone and neurotransmitter receptor. The  $\beta_2$ AR-Gs<sup>empty</sup> complex structure was subsequently determined by X-ray crystallography in 2011, which was the first crystal structure of an intact GPCR-G protein complex. Recently, several family A and family B GPCR structures in complex with either Gs or Gi/o proteins were determined by single-particle cryo-electron microscopy (cryo-EM). All of these complexes were captured the nucleotide-free state (GPCR-G<sup>empty</sup>). Unfortunately, these GPCR-G<sup>empty</sup> complex structures do not provide a clear explanation for G protein coupling specificity. Evidence from several sources suggests the existence of a transient complex between the GPCR and GDP-bound G protein (GPCR-G<sup>GDP</sup>) that may represent an intermediate on the way to the formation of GPCR-G<sup>empty</sup> and may

contribute to coupling specificity. However no structural information was available for the GPCR-G<sup>GDP</sup> complex.

Professor Brian Kobilka's group has observed that agonists alone do not fully stabilize the active state of the  $\beta_2$ AR. The active conformation of  $\beta_2$ AR required both extracellular agonists and intercellular binders such as G proteins or G protein mimic nanobodies. In an effort to develop a general applicable method to stabilize GPCRs in active conformation, the Kobilka lab at Tsinghua developed a protein engineering strategy by inserting the last 14 residues from the C terminus of G $\alpha_s$  (GsCT) between TM5 and TM6 of the  $\beta_2$ AR and introducing a disulfide bond to stabilize the interaction between the  $\beta_2$ AR and GsCT. The construct showed increased agonist affinity (a sign of active  $\beta_2$ AR conformation) and was named as  $\beta_2$ AR-T4L-GsCT-CC. Finally, a  $\beta_2$ AR-T4L-GsCT-CC structure was obtained at 3.7 Å resolution by crystallography



**Figure 1. Process of GPCR-G Protein Complex Formation**



**Figure 3. Proposed Process of GPCR-G Protein Complex Formation**

and the  $\beta 2\text{AR}$  indeed adopts active conformation in the structure. Interestingly, the interactions between  $\beta 2\text{AR}$  and  $\text{GsCT}$  observed in  $\beta 2\text{AR-T4L-GsCT-CC}$  structure are different from those in the  $\beta 2\text{AR-Gs}^{\text{empty}}$  complex (PDB:3SN6).  $\text{Y391}^{\text{Gas}}$  and  $\text{H387}^{\text{Gas}}$ , which interact with the  $\beta 2\text{AR}$  in the  $\beta 2\text{AR-Gs}^{\text{empty}}$  complex, are facing the solvent in the  $\beta 2\text{AR-T4L-GsCT-CC}$  structure. As a consequence of the rotation of the helix,  $\text{E392}^{\text{Gas}}$  and  $\text{R389}^{\text{Gas}}$ , which face the solvent in the  $\beta 2\text{AR-Gs}^{\text{empty}}$  complex, are interacting with the core of the  $\beta 2\text{AR}$  (Figure 2). MD simulations suggest that the interactions in the  $\beta 2\text{AR-T4L-GsCT-CC}$  structure are nearly as stable as those in the  $\beta 2\text{AR-Gs}^{\text{empty}}$  complex structure.

They then solved the GDP-bound  $\text{Gs}$  heterotrimer structure ( $\text{Gs}^{\text{GDP}}$ ) at 2.8 Å resolution. In the  $\text{Gs}^{\text{GDP}}$  structure,  $\text{Y391}^{\text{Gas}}$  and  $\text{H387}^{\text{Gas}}$  form intermolecular interactions with other residues in  $\text{Gas}$  while  $\text{E392}^{\text{Gas}}$  and  $\text{R389}^{\text{Gas}}$  are exposed to the protein surface, which suggests  $\text{E392}^{\text{Gas}}$  and  $\text{R389}^{\text{Gas}}$  are more likely to involve in the initial interaction with the  $\beta 2\text{AR}$ . They subsequently confirmed the important roles of  $\text{E392}^{\text{Gas}}$  and  $\text{R389}^{\text{Gas}}$  in efficiently  $\beta 2\text{AR-Gs}$  complex formation by mutagenesis studies. Finally they proposed a model of the dynamic process of the GPCR-G protein complex formation from separated  $\beta 2\text{AR}$  and  $\text{Gs}^{\text{GDP}}$  to the

$\beta 2\text{AR-Gs}^{\text{GDP}}$  complex and eventually to the  $\beta 2\text{AR-Gs}^{\text{empty}}$  complex (Figure 3). They also provided evidence that this intermediate state complex contributes to the G protein coupling specificity.

This work is the result of a collaboration between the Kobilka Lab at Tsinghua University and Stanford University, and Professor Peter Hildebrand's group at Charité Medical University Berlin and

University of Leipzig, as well as Dr. Jesper Mathiesen from University of Copenhagen. Professor Brian Kobilka and Dr. Xiangyu Liu from School of Medicine, Tsinghua University are the co-corresponding authors; Dr. Xiangyu Liu, Xinyu Xu (Tsinghua University) and Dr. Daniel Hilger (Stanford University) are the co-first authors. Dr. Hongtao Liu, Dr. Xiaou Sun from Tsinghua University and Dr. Yang Du from Stanford University (current address: Kobilka Institute of Innovation Drug Discovery (KIIDD), the Chinese University of Hongkong, Shenzhen) also contributed to the work. Dr. Kunio Hirata from Spring-8 synchrotron radiation facility performed automatic data collection for the project. The work was supported by the Beijing Innovation Center for Structural Biology.

**The original link:**

[https://www.cell.com/cell/fulltext/S0092-8674\(19\)30440-4](https://www.cell.com/cell/fulltext/S0092-8674(19)30440-4)

## The 10th Tsinghua University International Cultural Festival

The opening ceremony of the 10th version of the International Cultural Festival took place on Saturday May 11th, 2019, with the traditional Global Village where countries are represented by booths that the students have prepared.

His Excellency Mr. Masood Khalid, Ambassador of Pakistan to China, His Excellency Mr. Karunasena Kodituwakku, Ambassador of Sri Lanka to China, Mr. Raheel Tariq, First Secretary, Pakistan Embassy in China, and Mr. Muhammad Suleman Mahsud, Educational attaché,



Pakistan Embassy in China attended the event.

Yang Bin stated in his speech that the international cultural festival and cultural expo, which have become

the new tradition among Tsinghua students, are good embodiments of “A more Open and Confident Tsinghua”. Nearly 3,800 international students from 128 countries and regions learn from each other, exchange their unique cultures and ideas, and enrich the global competency education environment of Tsinghua University.



This year, guests were given a Global Village passport, to tour the “Tsinghua world” and “build bridges and greet the world.” Cultural artifacts, brochures and costumes were displayed at the booths of the 50 countries represented. The Indian stand offered their visitors Mehndi (henna tattoos), while the French played “pétanque”. Most of the stands prepared food and drinks. Korean rice cakes, crêpes, pasta and all kinds of different foods were offered at the event, to introduce partakers to the world’s cuisines.

“It is a great opportunity to show your country, people don’t always know what Nepal is about and I can educate them about my country,” said Sangeet Sangroula, journalism student from Nepal.

The day was enlivened by performances from the different cultures represented at Tsinghua,



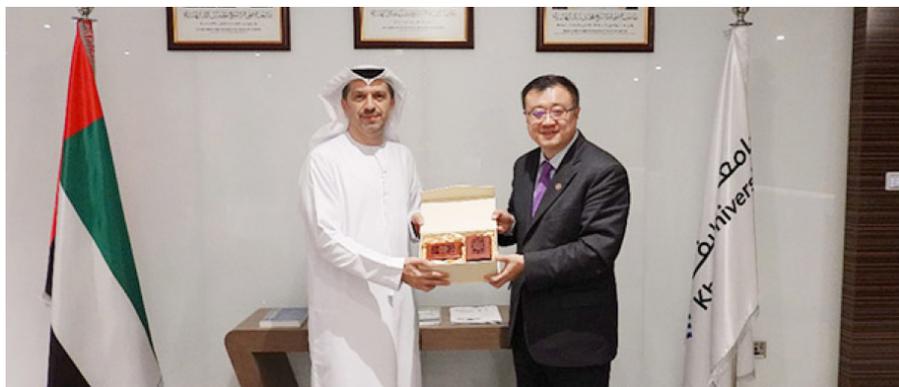
from martial arts to singing and dancing; the world’s arts were represented to satisfy everyone’s tastes. Isaac Banda from Malawi performed “Loliwe”, a song in Xhosa by the South African singer, Zahara. He said “I know how to sing and play the guitar, so even if I was nervous, it was a great opportunity for me to demonstrate my culture.”

This year’s International Cultural Festival is composed of six individual events, showcasing different aspects of the nationalities present on the Tsinghua campus:

Global Village 2019; “YEAH! World” Culture Series – Destination Southeast Asia; “YEAH! World” Culture Series – Sleepless Seoul; Tsinghua’s Got Talent Show; “YEAH! World” Culture Series – Japanese Campus Festival; and “YEAH! World” Culture Series – Africa Day Celebration.



# Tsinghua Vice President Yang Bin attended THE Asia Universities Summit and visited Khalifa University



From May 1st to 2nd, Tsinghua University Vice President and Provost Yang Bin visited the United Arab Emirates to attend the Times Higher Education Asia Universities Summit and delivered a keynote speech. During the summit, Yang Bin also visited Khalifa University to discuss academic cooperation between the two universities.

The theme of the Asia Universities Summit this year is “Connecting Asia, reaching West”. The summit was attended by about 250 delegates from over 60 universities around the world. At the summit, Yang Bin shared the ideas and measures of Tsinghua University in education and teaching reform, under the topic of “Perspectives from Tsinghua

University in a rapidly evolving Higher Education Environment: Crossing over from Cultivating “A” Students to “X” Students”, emphasizing the importance of cultivating diversified talents who have the courage to explore the unknown and are good at raising questions for a future innovative society.

Following the keynote speech at the Times Higher Education Innovation and Impact Summit held by the Korea Advanced Institute of Science and Technology (KAIST) in April this year, Yang Bin once again shared with his global counterparts the exploration and practice of China and Tsinghua University on innovation in higher education.

During the meeting, Yang Bin also visited Khalifa University and held talks with Dr. Arif Al Hammadi, the Executive Vice President. They exchanged views on cooperation between the two universities since the signing of the university-level MOU in 2017, and discussed future cooperation plans in high-level research and education.

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## Prof. Jianyang Zeng’s group develops a new 3D genome structure modeling approach

Three-dimensional chromosome structure modeling is crucial to understanding how the faraway regulatory elements on the genomic map come close to each other in the 3D space. Both Hi-C and FISH are two popular techniques for inspecting chromosomes. Through contact frequencies, Hi-C gives an indirect way to investigate how two genomic loci are far or close to each other in the 3D space. On the other hand, FISH data can directly provide the average spatial distance between two genomic loci through imaging

them.

Prof. Jianyang Zeng’s group at the Institute for Interdisciplinary Information Sciences (IIIS) and collaborators, proposed GEM-FISH, a method that systematically integrates both Hi-C and FISH data with the available prior biophysical knowledge about 3D polymers to reconstruct the 3D chromosome models. The work is recently published in *Nature Communications*. In the paper, they have shown that GEM-FISH can reconstruct more accurate 3D chromosome models than when

using Hi-C data alone in terms of the accurate positioning of topologically associated domains (TADs) and their partitioning into the two compartments A and B. In addition, GEM-FISH could accurately capture the high-resolution features of the chromosomes. For instance, it could capture the spatial proximity of loop loci, the colocalization of genomic loci from the same subcompartment, the tendency of expressed genes to lie close to the chromosome surface. They have also found interesting patterns of the spatial distributions

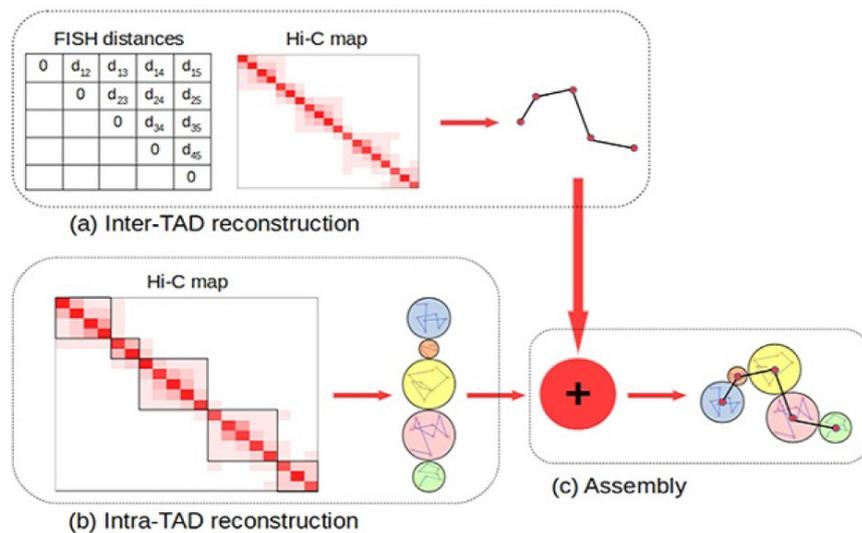
of super-enhancers on the three investigated autosomes (Chrs 20, 21, and 22), which can provide useful insights on the regulatory roles of super-enhancers in controlling the expression of cell identity genes.

This work is joint work with Prof. Michael Zhang (Department of Biological Sciences, Center for Systems Biology, the University of Texas at Dallas and MOE Key Laboratory of Bioinformatics, Tsinghua University) and Prof. Juntao Gao (MOE Key Laboratory of Bioinformatics, Tsinghua University). Prof. Jianyang Zeng, leader of the Machine Learning and Computational Biology research group at the Institute for Interdisciplinary Information Sciences (IIIS) at Tsinghua University, and his post-doc Dr. Ahmed Abbas are the corresponding and first authors of the paper, respectively. The work is also supported by National Natural Science Foundation of China.

This work is joint work with Prof. Michael Zhang (Department of Biological Sciences, Center for Systems Biology, the University of Texas at Dallas and MOE Key Laboratory of Bioinformatics, Tsinghua University) and Prof. Juntao Gao (MOE Key Laboratory of Bioinformatics, Tsinghua University). Prof. Jianyang Zeng, leader of the Machine Learning and Computational Biology research group at the Institute for Interdisciplinary Information Sciences (IIIS) at Tsinghua University, and his post-doc Dr. Ahmed Abbas are the corresponding and first authors of the paper, respectively. The work is also supported by National Natural Science Foundation of China.

**The full paper is available at**  
<https://www.nature.com/articles/s41467-019-10005-6>.

(From the Institute for Interdisciplinary Information Sciences (IIIS), Tsinghua University)



Flowchart of the new 3D genome structure modeling approach

# Wei Xie's group and joint team published research in Nature Genetics on SETD2 regulating establishment of maternal epigenome, genomic imprinting and embryonic development

A joint team led by Prof. Wei Xie from Tsinghua University, Prof. Li Li from Ren Ji Hospital at Shanghai Jiao Tong University, and Prof. Wei Li from Institute of Zoology at Chinese Academy of Sciences, has revealed how the mammalian oocyte epigenome is established through extensive cross-talk among epigenetic modifications, and how a functional maternal epigenome in turn has a profound impact on embryonic development.

Their findings, published in Nature Genetics on April 29th, 2019, not only demonstrated dynamic interactions between epigenetic marks during oogenesis, but also revealed SETD2 as a crucial player in establishing the maternal epigenome that in turn controls embryonic development.

The mammalian oocyte epigenome plays critical roles in gametogenesis and embryogenesis. Yet, how it is established remains

elusive. By depleting Setd2, a histone methyltransferase for H3K36me3, during mouse oogenesis, the researchers discovered that the deficiency of SETD2 leads to a compromised oogenesis and to infertility. Further investigation revealed extensive alterations of the oocyte epigenome, including the loss of H3K36me3, failure in establishment of correct DNA methylome, invasion of H3K4me3 and H3K27me3 into former H3K36me3 territories, and aberrant acquisition of H3K4me3 instead of DNA methylation at imprinting control regions. More importantly, maternal depletion of SETD2 results in oocyte maturation defects and subsequent 1-cell arrest after fertilization. Carefully-designed chromatin-cytosol swapping experiments revealed that the preimplantation arrest is mainly due to maternal cytosolic defect, as it can be largely rescued by wild-type oocyte cytosol. However, chromatin defects, including aberrant imprinting, persist in these embryos,

leading to embryonic lethality after implantation. Thus, these data identify SETD2 as a crucial player in establishing the maternal epigenome that in turn controls embryonic development.

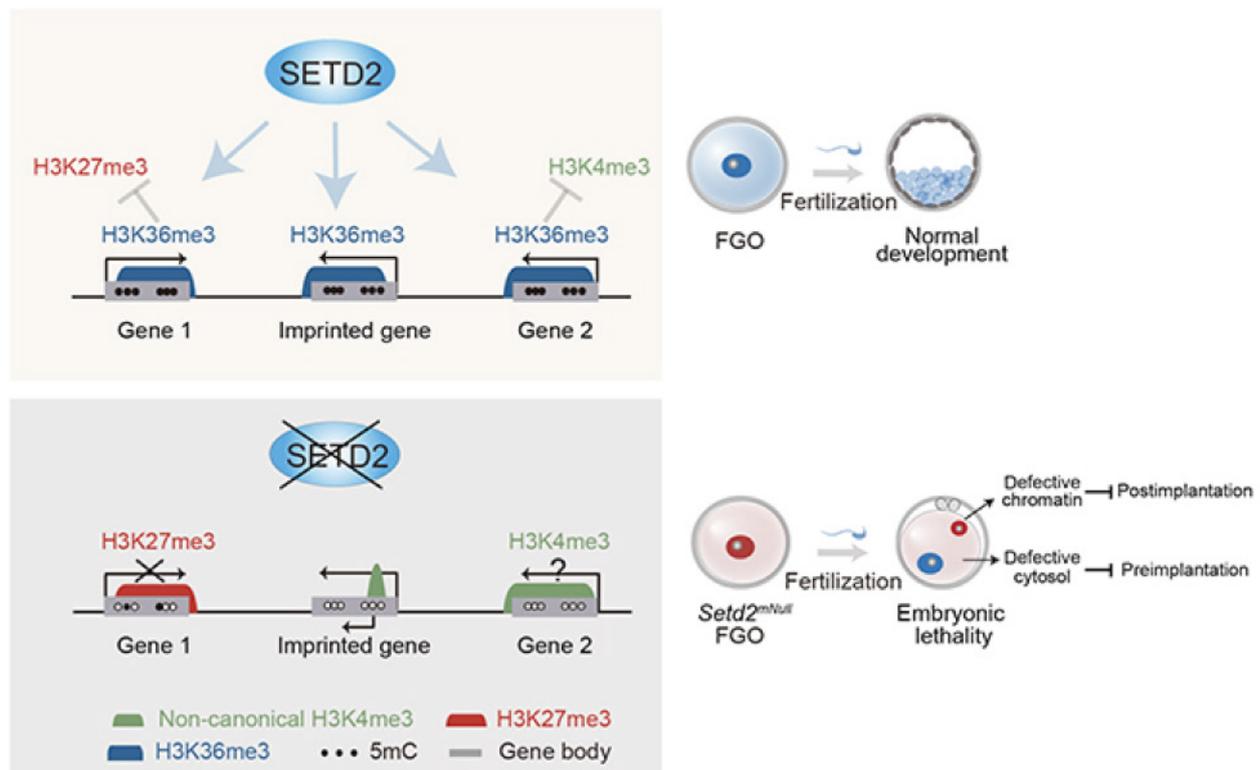
Prof. Wei Xie from the School of Life Science at Tsinghua University, Prof. Li Li from Ren Ji Hospital at Shanghai Jiao Tong University, and Prof. Wei Li from the Institute of Zoology at the Chinese Academy of Sciences are the co-corresponding authors of this work. Postdoc fellow Qianhua Xu from CLS program at Tsinghua university, Ph.D student Yunlong Xiang from CLS program, Ph.D student Qijun Wang from the School of Life Sciences at Tsinghua University, and the Postdoc fellow Leyun Wang from the Institute of Zoology at the Chinese Academy of Sciences are the co-first authors of this work. Prof. Matthew C. Lorincz and Prof. Louis Lefebvre from the University of British Columbia, Prof. Min Wu from Wuhan University, Prof. Cheryl Lyn Walker from Baylor

College of Medicine, and Prof. Eric Jonasch from the University of Texas MD Anderson Cancer Center also made important contributions to this study. This work was supported by the National Natural Science Foundation of China, the National Key R&D Program of China, the National Basic Research Program of China, Beijing Municipal Science & Technology Commission, Science and Technology Commission of Shanghai Municipality, the THU-PKU Center for Life Sciences, the Canadian Institutes of Health Research, the National Cancer Institute, and National Institutes of Health, the Innovation Research Plan from the Shanghai Municipal Education Commission and the State Key Laboratory of Oncogenes and Related Genes. Prof. Wei Xie is also a HHMI International Research Scholar.

(From School of Life Sciences)

**Paper Link:**

<https://www.nature.com/articles/s41588-019-0398-7>



**SETD2 regulates oocyte epigenome, genomic imprinting, and embryonic development**

# 2019 Postgraduate Work Exhibition of Academy of Arts and Design

On the afternoon of May 10th 2019, the Postgraduate Work Exhibition of the Academy of Arts and Design, Tsinghua University was launched at Tsinghua University Art Museum.

A total of 176 postgraduates (including 27 masters of arts from the Graduate School at Shenzhen) participated in the exhibition and displayed about 1,000 works.

Co-hosted by Tsinghua University Academy of Arts and Design and the Graduate School at Shenzhen, the exhibition is held in Hall 4 on the second floor and Halls 7, 8, and 14 on the fourth floor of Tsinghua University Art Museum, and the halls in Areas A and B of Tsinghua University Academy of Arts and Design.

The exhibition will last until May 30th, and is open to the public.

