

# CHUN-HUI GAO (高春辉)

Ph. D, Microbiology, bioinformatician, data scientist and useR.

I am broadly interested in the data mining, particularly integration and visualization, of biological, industrial and social datasets, which comes from high-throughput screening, Next-Generation Sequencing (NGS), public databases and so on.



## WORK EXPERIENCE

current   2016-3	<b>Post-doc Lecturer</b> College of Resources and Environment 📍 Huazhong Agricultural University
2020-10   2019-11	<b>Data Scientist</b> 北京热心肠生物技术研究院有限公司 📍 Beijing, China
2015-5   2013-2	<b>Post-doctoral Fellow</b> School of Life Science 📍 University of Science and Technology of China
2012-12   2012-7	<b>Lecturer</b> School of Food and Biological Engineering 📍 Hubei University of Technology

## EDUCATION

2012-6   2007-9	<b>PhD., Microbiology</b> Huazhong Agricultural University 📍 Wuhan, CN  • Thesis: The characterization of a novel ArsR-type regulator in <i>Mycobacterium tuberculosis</i> and the characterization of molecular basis of isoniazid drug resistance in Mycobacteria
2008-7   2004-9	<b>B. S., Biotechnology</b> Huazhong Agricultural University 📍 Wuhan, CN  • bachelor-master continuous program
2016-7   2016-6	<b>The SCELSE Summer Course</b> Singapore Centre for Environmental Life Sciences Engineering 📍 Singapore, SG

## CONTACT

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## SKILLS

- Molecular microbiology
- High-throughput sequencing
- Microbial ecology
- Bioinformatics
- Programming
- Data visualization

*View online version of this CV at [r.bio-spring.info/cv](http://bio-spring.info/cv).*

*Made with the R package [pagedown](#).*

*The source code is available at [github.com/gaospecial/cv](https://github.com/gaospecial/cv).*

*Last updated on 2021-08-25.*



## RESEARCH SUMMARY

2007  
|  
2009

### Whole genome protein-protein and TF-promoter interactome in *M. tuberculosis*

College of Life Science and Technology

📍 Huazhong Agricultural University

We used a bacterial two-hybrid method to construct the whole genome protein-protein interaction (PPI) network, and a bacterial one-hybrid method to construct the whole genome transcriptional regulator (TF) - promoter interaction network in *M. tuberculosis*.

2009  
|  
2012

### Novel transcriptional regulator in mycobacteria

College of Life Science and Technology

📍 Huazhong Agricultural University

- An ArsR-like transcriptional factor recognizes a conserved sequence motif and positively regulates the expression of *phoP* in mycobacteria
- A TetR-like regulator broadly affects the expressions of diverse genes in *Mycobacterium smegmatis*
- Characterization of a Novel ArsR-Like Regulator Encoded by Rv2034 in *Mycobacterium tuberculosis*

2009  
|  
2014

### The intra-action between three RelBE modules and inter-action between RelBE3/SirR

College of Life Science and Technology

📍 Huazhong Agricultural University

- Characterization of the Interaction and Cross-Regulation of Three *Mycobacterium tuberculosis* RelBE Modules.
- Characterization of the interaction between a SirR family transcriptional factor of *Mycobacterium tuberculosis*, encoded by Rv2788, and a pair of toxin-antitoxin proteins RelJ/K, encoded by Rv3357 and Rv3358.

2013  
|  
2014

### The regulation of secondary metabolite ( $\epsilon$ -poly lysine) biosynthesis in *Streptomyces albus* ZPM

School of Life Science

📍 University of Science and Technology of China

- Identification of genetic variations associated with epsilon-poly-lysine biosynthesis in *Streptomyces albulus* ZPM by genome sequencing.

2014  
|  
2015

### The distribution of type III-A CRISPR-Cas system in *Staphylococcus aureus* clinical isolates

School of Life Science

📍 University of Science and Technology of China

- Identification and functional study of type III-A CRISPR-Cas systems in clinical isolates of *Staphylococcus aureus*.

### Professional Competence

#### Microbiology

- Transcriptional regulator
- Drug resistance
- Pathogenesis
- Persistence

#### Microbial ecology

- Social interaction
- Co-culture
- Multispecies biofilm

#### NGS

- (meta-)Genomics
- (meta-)RNA-seq
- Microbiome
- ChIP-seq

#### Bioinformatics

- Linux
- Perl
- R

#### Visualization

- ggplot2
- ggVennDiagram
- Reproducible research

#### Skills

- Write R package
- Statistics
- Illustration
- Bibliometric
- Data mining

2012  
|  
2019

### The regulatory mechanism of drug susceptibility in mycobacteria

State Key Laboratory of Agricultural Microbiology  
📍 Huazhong Agricultural University

- InbR, a TetR family regulator, binds with isoniazid and influences multidrug resistance in *Mycobacterium bovis* BCG
- OxiR specifically responds to isoniazid and regulates isoniazid susceptibility in mycobacteria
- Cross-talk between the three furA orthologs in *Mycobacterium smegmatis* and the contribution to isoniazid resistance

2016  
|  
2021

### Unearthing the mechanism of soil biofilms

College of Resources and Environment  
📍 Huazhong Agricultural University

- *Bacillus subtilis* biofilm development in the presence of soil clay minerals and iron oxides
- Co-culture of soil biofilm isolates enables the discovery of novel antibiotics
- Soil biofilms: microbial interactions, challenges, and advanced techniques for *ex-situ* characterization
- Impact of metal oxide nanoparticles on *in vitro* DNA amplification

2016  
|  
2021

### Regulation of synthetic bacteria community

College of Resources and Environment  
📍 Huazhong Agricultural University

- The initial inoculation ratio regulates bacterial coculture interactions and metabolic capacity
- Emergent transcriptional adaption facilitates convergent succession within a synthetic community
- Divergent Influence to a Pathogen Invader by Resident Bacteria with Different Social Interactions

## ↗ GRANTS

2024  
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2022

CNY ¥ 24 (主持)  
NSFC 青年科学基金

2021  
|  
2016

CNY ¥ 72.5 (主持)  
国家重点研发计划子课题

2016  
|  
2013

CNY ¥ 5 (主持)  
博士后基金面上项目

## 👤 TEACHING EXPERIENCE

2018-7	RNA-seq从入门到精通 华中农业大学暑期生物信息学培训班	📍 武汉
2018-5	土壤微生物组 undergraduate students	📍 Wuhan, CN
2016-12	土壤中的多物种生物膜 graduated students	📍 Wuhan, CN

## 👥 CONFERENCES

### 🗣 ORAL PRESENTATIONS

2021-6-24	二菌株合成菌群收敛演化的分子机制 土壤生物多样性与生物化学过程研讨会	📍 安徽合肥
2021-6-20	关于土壤健康，微生态研究给我带来的3个遐想 第二届土壤生物健康研讨会	📍 海南兴隆
2020-12-27	微生物之间的协作有利于细菌的存活和代谢 全国土壤生物生化与土壤健康学术研讨会	📍 上海
2020-12-24	土壤生物膜的形成和群落演替 中国土壤学会第十三次全国会员代表大会	📍 西安
2017		
2016		

### 📖 CONFERENCE ABSTRACT

2017-10-19	“Divergent influence to pathogen invader by environmental isolates with different social interactions”	📍 Nanjing, CN
2017-10-15	The 2nd Global Soil Biodiversity Conference	

### 👤 CONFERENCE PARTICIPATION

2021-7-12	第八届全国微生物基因组学学术研讨会 <i>present</i>	📍 Wuhan, CN
2021-7-10		
2021-5-30	中国肠道大会 2021 <i>present</i>	📍 Nanjing, CN
2021-5-28		

2019-6-14	深圳市合成生物产业发展研讨会 <i>present</i>	📍 Shenzhen, CN
2019-5-6	中国肠道大会 2019 <i>present</i>	📍 Beijing, CN
2019-5-5		
2018-9-24	<b>Sino-German Symposium on Microbiomics and Plant Health</b> <i>present</i>	📍 Wuhan, CN
2018-11-25	“不忘初心，牢记使命”教工党员培训班 <i>present</i>	📍 Shaoshan, CN
2018-11-24		
2018-11-17	土壤微生物新理论新技术研讨会暨培训班 <i>present</i>	📍 Nanjing, CN
2018-11-15		

## 👑 SCHOOL HONORS

2012   2011	农业微生物学国家重点实验室优秀研究生 10 each year	📍 Wuhan, CN
2012	优秀毕业研究生 n.a.	📍 Wuhan, CN
2011   2010	三好研究生 n.a.	📍 Wuhan, CN
2009   2008	三好研究生 n.a.	📍 Wuhan, CN
2008	优秀毕业生 5 out of 45	📍 Wuhan, CN
2007   2006	三好学生 10 out of 45	📍 Wuhan, CN
2006   2005	优秀团员 5 out of 45	📍 Wuhan, CN
2005   2004	三好学生 10 out of 45	📍 Wuhan, CN

## PUBLICATIONS

2021

### Emergent Transcriptional Adaption Facilitates Convergent Succession within a Synthetic Community

ISME Communications, 2021, Accepted:

- Gao, Chun-Hui; Cao, Hui; Ju, Feng; Xiao, Ke-Qing; Cai, Peng; Wu, Yichao; Huang, Qiaoyun

- Citation = 928
- H-index = 17
- I10-index = 23

### ggVennDiagram: An Intuitive, Easy-to-Use, and Highly Customizable R Package to Generate Venn Diagram

Frontiers in Genomics, 2021, 12:706907

- Gao, Chun-Hui; Yu, Guangchuang; Cai, Peng

### The Initial Inoculation Ratio Regulates Bacterial Coculture Interactions and Metabolic Capacity

The ISME Journal, 2021, 15(1):29–40

- Gao, Chun-Hui; Cao, Hui; Cai, Peng; S, SJ.

### Cd(II)-Binding Transcriptional Regulator Interacts with Isoniazid and Regulates Drug Susceptibility in Mycobacteria

Journal of Biochemistry, 2021, 169(1):43–53

- Yang, Min; Jia, Shi-Hua; Tao, Hui-Ling; Zhu, Chen; Jia, Wan-Zhong; Hu, Li-Hua; Gao, Chun-Hui

2020

### 平衡肠道微生态

《活出健康: 免疫力就是好医生》 (王贵强, 王立祥, 张文宏主编), 2020

- 高春辉; 蓝灿辉

### Seven Facts and Five Initiatives for Gut Microbiome Research

Protein & Cell, 2020, 11(6):391–400

- Li, Danyi; Gao, Chun-Hui; Zhang, Faming; Yang, Ruifu; Lan, Canhui; Ma, Yonghui; Wang, Jun

### The Exopolysaccharide-eDNA Interaction Modulates 3D Architecture of *Bacillus Subtilis* Biofilm

Bmc Microbiology, 2020, 20(1):115

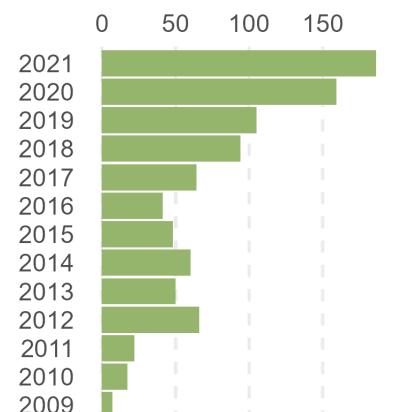
- Peng, Na; Cai, Peng; Mortimer, Monika; Wu, Yichao; Gao, Chun-Hui; Huang, Qiaoyun

2019

### Soil Biofilms: Microbial Interactions, Challenges, and Advanced Techniques for Ex-Situ Characterization

Soil Ecology Letters, 2019, 1(3-4):85–93

- Cai, Peng; Sun, Xiaojie; Wu, Yichao; Gao, Chun-Hui; Mortimer, Monika; Holden, Patricia A.; Redmile-Gordon, Marc; Huang, Qiaoyun



data from Google Scholar

**Cross-Talk between the Three furA Orthologs in Mycobacterium Smegmatis and the Contribution to Isoniazid Resistance**

**The Journal of Biochemistry**, 2019, 166(3):237–243

- Gao, Chun-Hui; Wei, Wen-Ping; Tao, Hui-Ling; Cai, Li-Kai; Jia, Wan-Zhong; Hu, Lihua; Yang, Min

**Divergent Influence to a Pathogen Invader by Resident Bacteria with Different Social Interactions**

**Microbial Ecology**, 2019, 77(1):76–86

- Gao, Chun-Hui; Zhang, Ming; Wu, Yichao; Huang, Qiaoyun; Cai, Peng

**Impact of Metal Oxide Nanoparticles on in Vitro DNA Amplification**

**PeerJ**, 2019, 7:e7228

- Gao, Chun-Hui; Mortimer, Monika; Zhang, Ming; Holden, Patricia A.; Cai, Peng; Wu, Shan; Xin, Yuexing; Wu, Yichao; Huang, Qiaoyun

**Extraction of Extracellular Polymeric Substances (EPS) from Red Soils (Ultisols)**

**Soil Biology and Biochemistry**, 2019, 135:283–285

- Wang, Shuang; Redmile-Gordon, Marc; Mortimer, Monika; Cai, Peng; Wu, Yichao; Peacock, Caroline L.; **Gao, Chun-Hui**; Huang, Qiaoyun

**Soil Biofilm Formation Enhances Microbial Community Diversity and Metabolic Activity**

**Environment International**, 2019, 132:105116

- Wu, Yichao; Cai, Peng; Jing, Xinxin; Niu, Xueke; Ji, Dandan; Ashry, Noha Mohamed; **Gao, Chun-Hui**; Huang, Qiaoyun

**OxiR Specifically Responds to Isoniazid and Regulates Isoniazid Susceptibility in Mycobacteria**

**FEMS microbiology letters**, 2019, 366(10):

- Yang, Min; Zhang, Li; Tao, Hui-Ling; Sun, Yuan-Chao; Lou, Zhong-Zi; Jia, Wan-Zhong; Hu, Li-Hua; **Gao, Chun-Hui**

**Impact of Soil Clay Minerals on Growth, Biofilm Formation, and Virulence Gene Expression of Escherichia Coli O157:H7**

**Environmental Pollution**, 2018, 243(B):953–960

- Cai, Peng; Liu, Xing; Ji, Dandan; Yang, Shanshan; Walker, Sharon L.; Wu, Yichao; **Gao, Chun-Hui**; Huang, Qiaoyun

**Co-Culture of Soil Biofilm Isolates Enables the Discovery of Novel Antibiotics**

**bioRxiv**, 2018, 353755

- Gao, Chun-Hui; Cai, Peng; Li, Zhunjie; Wu, Yichao; Huang, Qiaoyun

2018

**Towards a Better Understanding of the Aggregation Mechanisms of Iron (Hydr)Oxide Nanoparticles Interacting with Extracellular Polymeric Substances: Role of pH and Electrolyte Solution**

**Science of The Total Environment**, 2018, 645:372–379

- Lin, Di; Cai, Peng; Peacock, Caroline L.; Wu, Yichao; Gao, Chun-Hui; Peng, Wanxi; Huang, Qiaoyun; Liang, Wei

**Metabolism, Survival, and Gene Expression of Pseudomonas Putida to Hematite Nanoparticles Mediated by Surface-Bound Humic Acid**

**Environmental Science-Nano**, 2018, 5(3):682–695

- Ouyang, Kai; Walker, Sharon L.; Yu, Xiao-Ying; Gao, Chun-Hui; Huang, Qiaoyun; Cai, Peng

**Recent Advances in Microbial Electrochemical System for Soil Bioremediation**

**Chemosphere**, 2018, 211:156–163

- Wu, Yichao; Jing, Xinxin; Gao, Chun-Hui; Huang, Qiaoyun; Cai, Peng

2017

**Survival of Escherichia Coli O157:H7 in Various Soil Particles: Importance of the Attached Bacterial Phenotype**

**Biology and Fertility of Soils**, 2017, 53(2):209–219

- Liu, Xing; Gao, Chun-Hui; Ji, Dandan; Walker, Sharon L.; Huang, Qiaoyun; Cai, Peng

**Bacillus Subtilis Biofilm Development in the Presence of Soil Clay Minerals and Iron Oxides**

**npj Biofilms and Microbiomes**, 2017, 3(1):4

- Ma, Wenting; Peng, Donghai; Walker, Sharon L.; Cao, Bin; Gao, Chun-Hui; Huang, Qiaoyun; Cai, Peng

**Effects of Humic Acid on the Interactions between Zinc Oxide Nanoparticles and Bacterial Biofilms**

**Environmental Pollution**, 2017, 231(1):1104–1111

- Ouyang, Kai; Yu, Xiao-Ying; Zhu, Yunlin; Gao, Chun-Hui; Huang, Qiaoyun; Cai, Peng

**Metal-Free Inactivation of E. Coli O157:H7 by Fullerene/C<sub>3</sub>N<sub>4</sub> Hybrid under Visible Light Irradiation**

**Ecotoxicology and Environmental Safety**, 2017, 136:40–45

- Ouyang, Kai; Dai, Ke; Chen, Hao; Huang, Qiaoyun; Gao, Chun-Hui; Cai, Peng

自然环境中的多物种生物膜:研究方法及社群相互作用

**农业资源与环境学报**, 2017, (01):6–14

- 孙晓洁; 高春辉; 黄巧云; 蔡鹏

- 2016
- 大肠杆菌表面感应机制研究进展  
**浙江大学学报(农业与生命科学版)**, 2017, 43(6):685–690  
· 王立亮; 高春辉; 吴一超; 黄巧云; 蔡鹏
- Identification and Functional Study of Type III-A CRISPR-Cas Systems in Clinical Isolates of *Staphylococcus Aureus*  
**International Journal of Medical Microbiology**, 2016, 306(8):686–696  
· Cao, Linyan; Gao, Chun-Hui; Zhu, Jiade; Zhao, Liping; Wu, Qingfa; Li, Min; Sun, Baolin
- 2015
- Identification of Genetic Variations Associated with Epsilon-Poly-Lysine Biosynthesis in *Streptomyces Albulus ZPM* by Genome Sequencing  
**Scientific Reports**, 2015, 5:9201  
· Wang, Lin; Gao, Chun-Hui; Tang, Nan; Hu, Songnian; Wu, Qingfa
- InbR, a TetR Family Regulator, Binds with Isoniazid and Influences Multidrug Resistance in *Mycobacterium Bovis BCG*  
**Scientific Reports**, 2015, 5:13969  
· Yang, Min; Gao, Chun-Hui; Hu, Jialing; Zhao, Lei; Huang, Qiaoyun; He, Zheng-Guo
- 2014
- Characterization of the Interaction between a SirR Family Transcriptional Factor of *Mycobacterium~Tuberculosis*, Encoded by Rv2788, and a Pair of Toxin-Antitoxin Proteins RelJ/K, Encoded by Rv3357 and Rv3358  
**The FEBS journal**, 2014, 281(12):2726–2737  
· Yang, Min; Gao, Chun-Hui; Hu, Jialing; Dong, Chao; He, Zheng-Guo
- A Novel marRAB Operon Contributes to the Rifampicin Resistance in *Mycobacterium Smegmatis*  
**PLoS ONE**, 2014, 9(8):e106016  
· Zhang, Haiwei; Gao, Long; Zhang, Jiaoling; Li, Weihui; Yang, Min; Zhang, Hua; Gao, Chun-Hui; He, Zheng-Guo
- 2012
- Characterization of a Novel ArsR-Like Regulator Encoded by Rv2034 in *Mycobacterium Tuberculosis*  
**PloS One**, 2012, 7(4):e36255  
· Gao, Chun-Hui; Yang, Min; He, Zheng-Guo
- A TetR-like Regulator Broadly Affects the Expressions of Diverse Genes in *Mycobacterium Smegmatis*  
**Nucleic Acids Research**, 2012, 40(3):1009–1020  
· Yang, Min; Gao, Chun-Hui; Cui, Tao; An, Jingning; He, Zheng-Guo

2011

**An ArsR-like Transcriptional Factor Recognizes a Conserved Sequence Motif and Positively Regulates the Expression of phoP in Mycobacteria**

**Biochemical and Biophysical Research Communications**, 2011, 411(4):726–731

· Gao, Chun-Hui; Yang, Min; He, Zheng-Guo

2010

**Global Protein-Protein Interaction Network in the Human Pathogen *Mycobacterium Tuberculosis H37Rv***

**Journal of Proteome Research**, 2010, 9(12):6665–6677

· Wang, Yi; Cui, Tao; Zhang, Cong; Yang, Min; Huang, Yuanxia; Li, Weihui; Zhang, Lei; **Gao, Chun-Hui**; He, Yang; Li, Yuqing; Huang, Feng; Zeng, Jumei; Huang, Cheng; Yang, Qiong; Tian, Yuxi; Zhao, Chunchao; Chen, Huanchun; Zhang, Hua; He, Zheng-Guo

**Characterization of the Interaction and Cross-Regulation of Three *Mycobacterium Tuberculosis RelBE* Modules**

**PLoS ONE**, 2010, 5(5):e10672

· Yang, Min; **Gao, Chun-Hui**; Wang, Yi; Zhang, Hua; He, Zheng-Guo

2009

**Dissecting Transcription Regulatory Pathways through a New Bacterial One-Hybrid Reporter System**

**Genome Research**, 2009, 19(7):1301–1308

· Guo, Manman; Feng, Hui; Zhang, Jun; Wang, Wenqin; Wang, Yi; Li, Yuqing; **Gao, Chun-Hui**; Chen, Huanchun; Feng, Ying; He, Zheng-Guo

**Archaeal Eukaryote-like Orc1/Cdc6 Initiators Physically Interact with DNA Polymerase B1 and Regulate Its Functions**

**Proceedings of the National Academy of Sciences**, 2009, 106(19):7792–7797

· Zhang, Lu; Zhang, Lei; Liu, Yi; Yang, Shifan; **Gao, Chun-Hui**; Gong, Hongchao; Feng, Ying; He, Zheng-Guo