



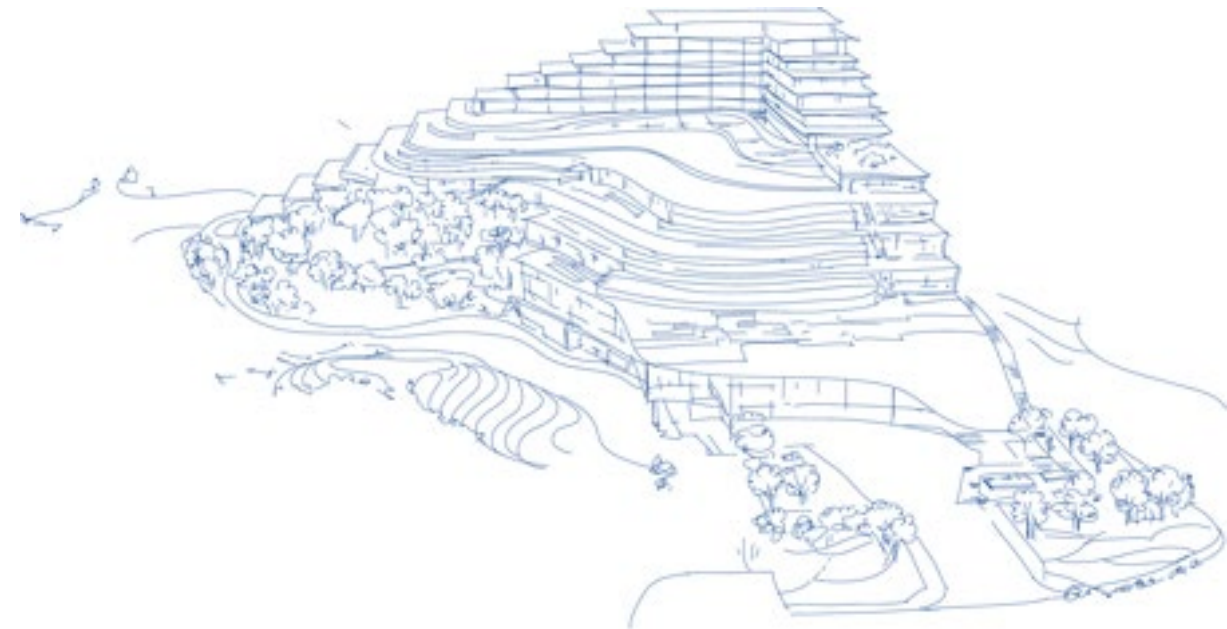
CNGB's approach to facilitate sharing and use of samples and data

Bo WANG, May 2019, ISBER 2019 Annual Meeting & Exhibits



CONTENT

- 1. Biobanks in China**
2. CNGB's Approach to Sample and Data Sharing
3. Standardization
4. Conclusion



Biobank in China - What are biobanks?

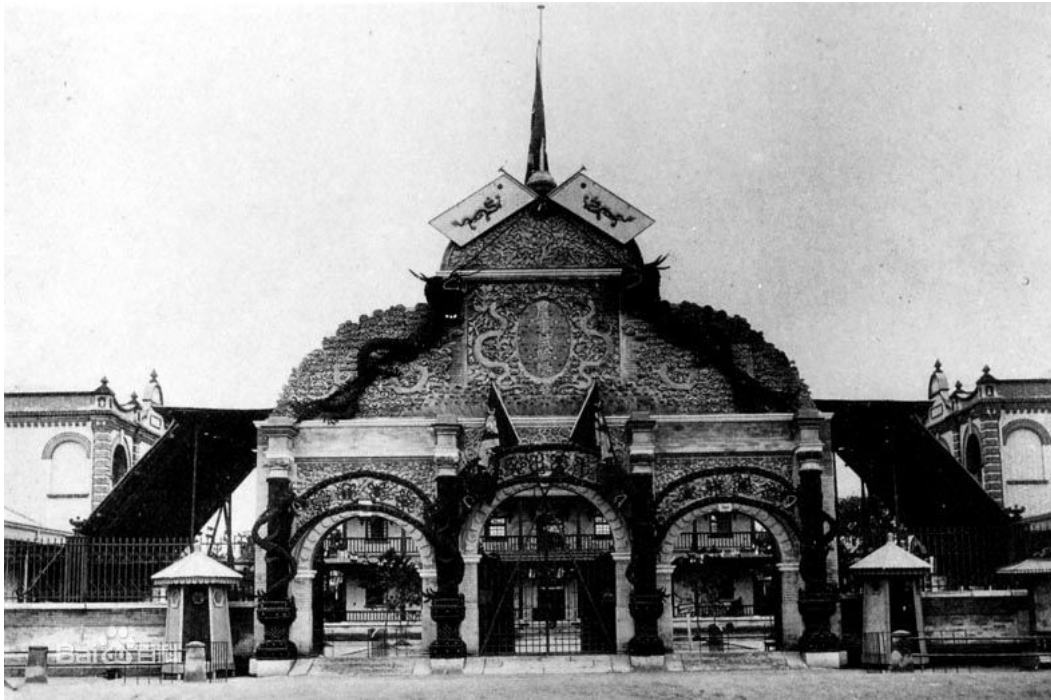
Common Keywords:

- **Name:** Biobank, Genebank, Biorepository, Biological Resource Center (BRC)
- **Function:** Structured collections of biological samples/specimens and associated data
- **Purpose:** for research studies, preserving human genetic resources and biodiversity
- **Activities:** collection, processing, quality control, storage, and distribution



Biobank in China - History

Collections of Animal specimens



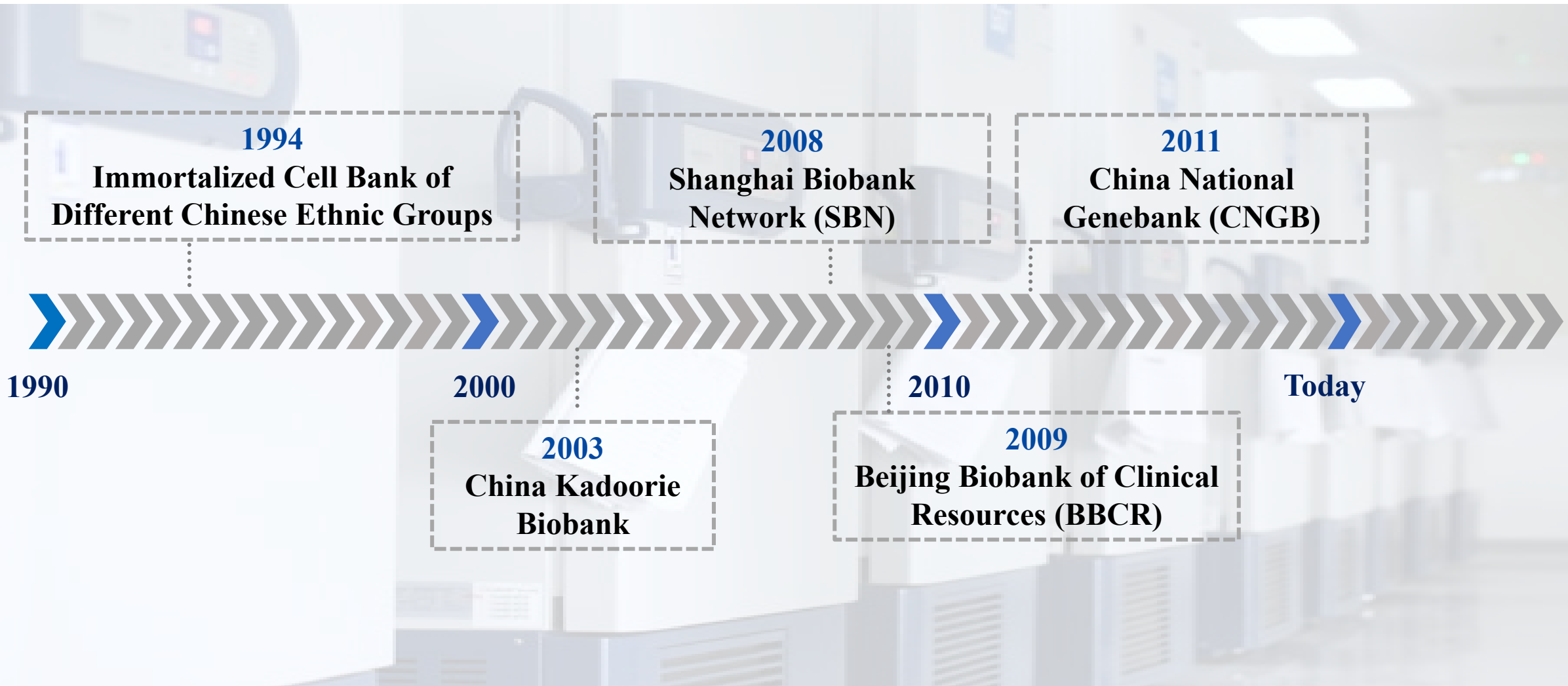
First zoo in China (1907). Animals imported from Hamburg kept in Beijing Zoo.



北劉標本制作創始人劉樹芳
大師1892. 6-1952. 6
他在宮裏為慈禧制作動物標本

First collection of animal specimens for Empress Cixi

Biobank in China - Modern biobanking in China



Biobanks in China — Development Trend

Biobank as Essential Tool for Research

Past

- Sample collection for particular testing in individual experiments
- No routine sample sharing with other laboratories

Present

- Transform from single-gene to multiple-gene or genome-wide study
- Transform from single-center studies to large-scale multicenter studies
- Needs of larger sample quantity

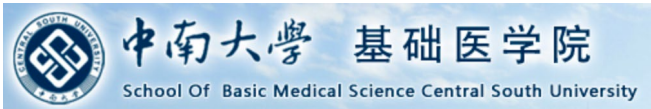
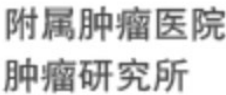
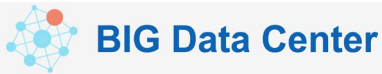
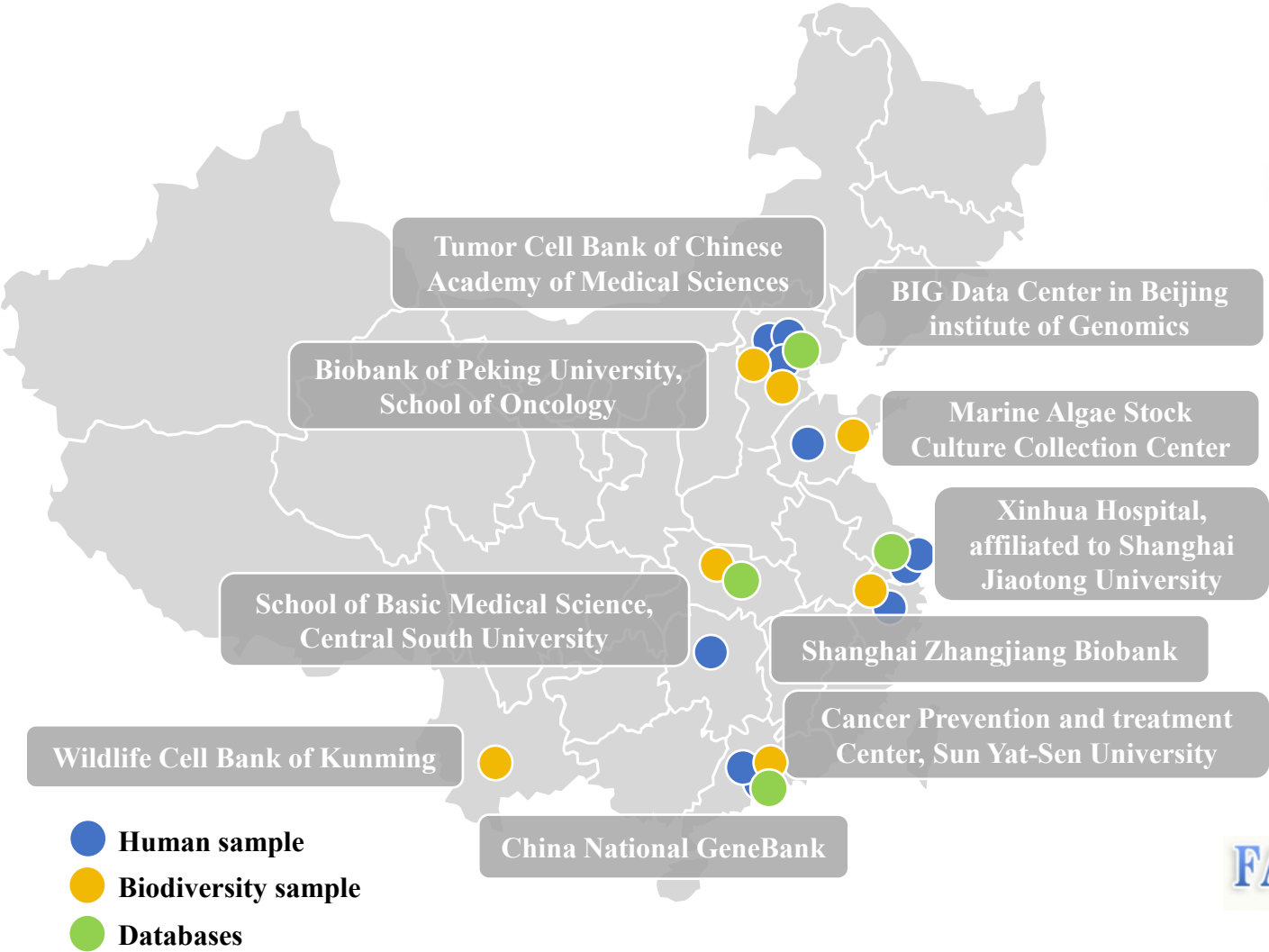
Future

- Must have systematic collection of samples and data
- Needs for wider sample sharing and phenotype data sharing

Biobanks in China – Biobanks and Databases



Growing Number of Biobanks and Databases in China



Biobanks in China – Genetic Resources Management

Genetic Resources Management in China

To better protect and use the human genetic resources in China and promote international collaboration with equality and mutual benefit

Interim Measures for the Administration of Human Genetic Resources

Published in **1998**

Human Genetic Resources Management Regulations

Public solicitation in 2012, 2016

人类遗传资源管理暂行办法

日期

(一九九八年六月)

第一条 为了有效保护和合理利用我国合作和交流,制定本办法。□

第二条 本办法所称人类遗传资源是指
物、重组脱氧核糖核酸(DNA)构建体等
的采集、收集、研究、开发、买卖、出口

第四条 国家对重要遗传家系和特定地域遗传资源的单位或个人，应及时向有关部门、出境或以其他方式对外提供。

国务院法制办公室关于《人类遗传资源管理条例（送审稿）》公开征求意见的通知

日期: 2016年02月04日 来源: 科技部

为了进一步增强立法公开性和透明度,提高立法质量,国务院法制办公室决定,将科技部起草的《人类遗传资源管理条例(送审稿)》及其说明公布,征求社会各界意见,以便进一步研究、修改后报请国务院审议。现将有关事项通知如下:

有关单位和各界人士可以在2016年3月7日前,通过以下三种方式提出意见:

(一) 登陆中国政府法制信息网(网址: <http://www.chinalaw.gov.cn>), 通过网站首页左侧的《法规规章草案意见征集系统》, 对送审稿提出意见。

(二) 通过信函方式将意见寄至：北京市2067信箱（邮政编码：100035），请在信封上注明“人类遗传资源管理条例征求意见”字样。

(三) 通过电子邮件方式将意见发送至: yczy@chinalaw.gov.cn

国务院法制办公室

To implement Nagoya Protocol and to regulate collection, usage and benefit sharing of biological genetic resources in China

Regulations for access and benefit-sharing of biological genetic resources

Public solicitation in **2017**

关于公开征求《生物遗传资源获取与惠益分享管理条例（草案）》（征求意见稿）意见的函

2017-03-23

为规范生物遗传资源获取、利用和惠益分享活动，积极履行《〈生物多样性公约〉关于获取遗传资源和公正公平分享其利用所产生惠益的名古屋议定书》，根据《国家安全立法规划》和国务院立法工作计划，我们起草了《生物遗传资源获取与惠益分享管理条例（草案）》（征求意见稿）。

为充分了解各有关方面意见,加快推进起草工作,按照立法工作要求,现就《生物遗传资源获取与惠益分享管理条例(草案)》(征求意见稿)(见附件)公开征求意见。各机关团体、企事业单位和个人均可向我部提出意见和建议。征求意见截止时间为2017年4月22日。

联系人：环境保护部自然生态保护司 彭慧芳、蔡蕾

联系电话: (010) 66556308、66556328

传真: (010) 66556593

电子邮箱: abschina@mee.gov.cn

通信地址: 北京市西直门南小街115号

邮政编码: 100035

附件：

1、《生物遗传资源获取与惠益分享管理条例(草案)》(征求意见稿)

2、《生物遗传资源获取与惠益分享管理条例（草案）》编制说明

Biobanks in China - Data Management

Growing Data Output

Measures for the Management of Scientific Data
issued by General Office of the State Council in April 2018

Most of the scientific data are uploaded to international databases outside of China (e.g. NCBI, EBI, DDBJ).

- Strengthen the life cycle management of scientific data
- Promote the development and utilization of scientific data,
- Promote open sharing of data and data security

国务院办公厅关于印发科学数据管理办法的通知

国办发〔2018〕17号

各省、自治区、直辖市人民政府，国务院各部委、各直属机构：

《科学数据管理办法》已经国务院同意，现印发给你们，请认真贯彻执行。

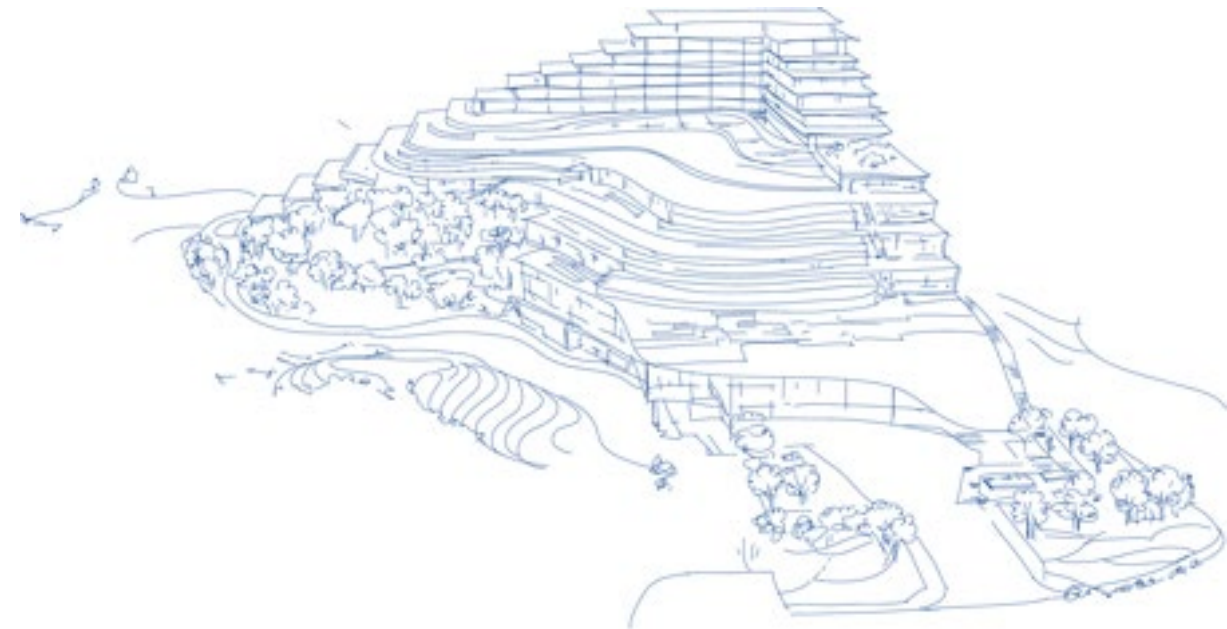
国务院办公厅

2018年3月17日



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1. Biobanks in China
- 2. CNGB's Approach to Sample and Data Sharing**
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CNGB's Approach to Sample and Data Sharing - Sample and Data Sharing

Sharing platforms in China

National Human Genetic Resources Sharing Services Platform:

Facilitate analysis of genetic and environmental factors in population evolution, physiology and development of major diseases. **15M+ samples**

World Data Center For Micro-organism:

Comprehensive information on culture collections world-wide. **3M+ micro-organism**

National Forest Genetic Resources Platform:

Strengthening the collection, preservation and open sharing of forest germplasm resources. **150k+ Species**

And many more...



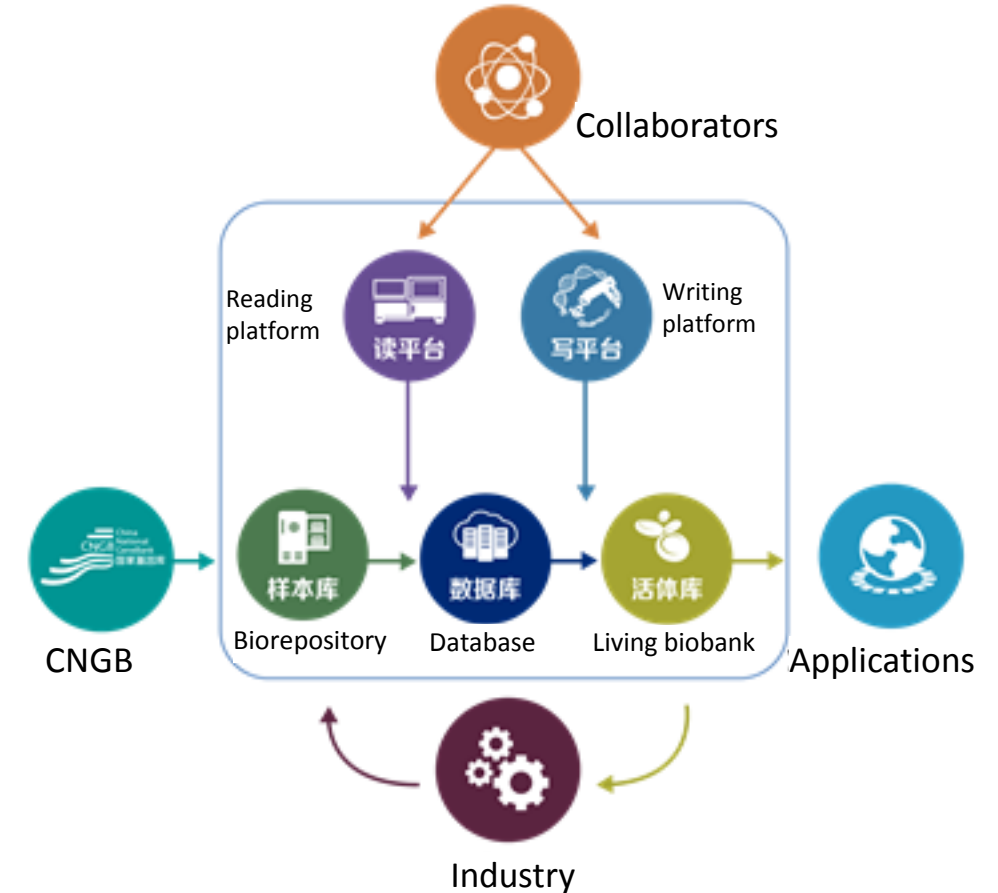
CNGB's Approach to Sample and Data Sharing

Mission

A platform for integrating resources and capabilities to support the development of the life sciences and bio-economy in China

Approved by government in 2011, with new facility launched in 2016, CNGB is:

1. An integrated gene bank consists of “**Three Banks and Two Platforms**” structure:
 - **Biorepository**
 - **Bioinformatics data Center**
 - **Living biobank of animal, plant and microorganism**
 - **Digitalization platform (Reading platform)**
 - **Synthesis & Editing Platform (Writing platform)**
2. A non-profit organization, all information is freely accessible to the public in order to support the life science research industry.

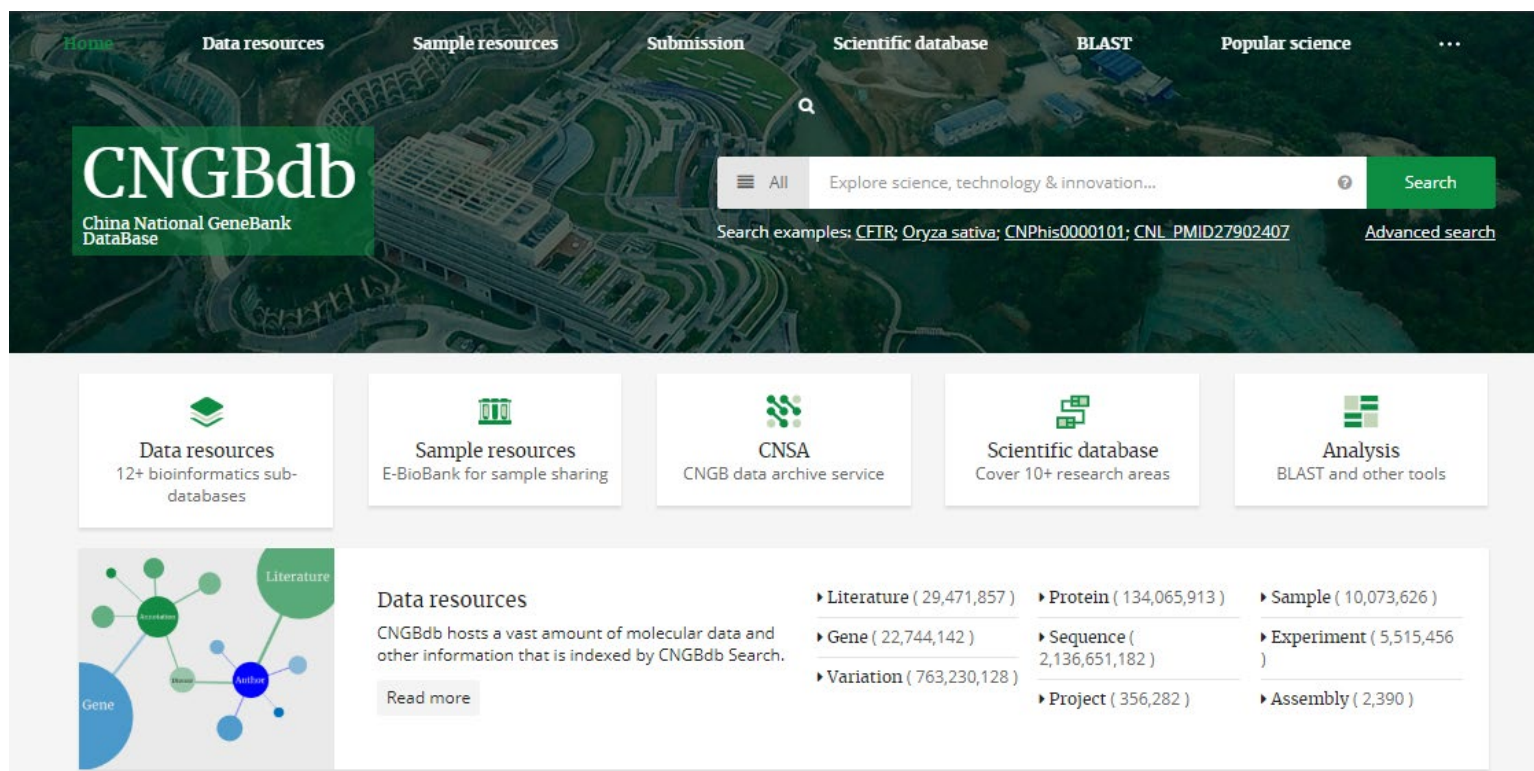


CNGB's Approach to Sample and Data Sharing - CNGBdb

China National GeneBank database (CNGBdb)

A Unified Platform For **Biological Big Data Sharing**

Provides services including data submission and storage, automatic archive and management, full retrieval and download, intelligent computing, and visualization of biological data.



The screenshot shows the CNGBdb website interface. At the top, there is a navigation bar with links: Home, Data resources, Sample resources, Submission, Scientific database, BLAST, Popular science, and a menu icon. Below the navigation bar is a large banner with the CNGBdb logo and the text "China National GeneBank DataBase". A search bar is prominently displayed with the placeholder text "Explore science, technology & innovation..." and a "Search" button. Below the search bar, there are search examples: "CFTR", "Oryza sativa", "CNPhis0000101", "CNL", "PMID27902407", and a link to "Advanced search".

Below the banner, there are five main service tiles:

- Data resources**: 12+ bioinformatics sub-databases
- Sample resources**: E-BioBank for sample sharing
- CNSA**: CNGB data archive service
- Scientific database**: Cover 10+ research areas
- Analysis**: BLAST and other tools

At the bottom, there is a section titled "Data resources" with a sub-header "Literature". It states: "CNGBdb hosts a vast amount of molecular data and other information that is indexed by CNGBdb Search." Below this, there is a "Read more" button. To the right of the text, there are several data points:

- Literature (29,471,857)
- Gene (22,744,142)
- Variation (763,230,128)
- Protein (134,065,913)
- Sequence (2,136,651,182)
- Project (356,282)
- Sample (10,073,626)
- Experiment (5,515,456)
- Assembly (2,390)

10 TB+
Metadata

3 Billions+
Indexed data items

500 TB+
Archived data

10+
Scientific databases

- Immunity

- Tumors

- Pathogens

- Microorganisms

- Rare Diseases

- Species Diversity

● ...

[illegible]

CNGB's Approach to Sample and Data Sharing - CNGBdb

Cancer Data Integration and Analysis Platform - DISSECT

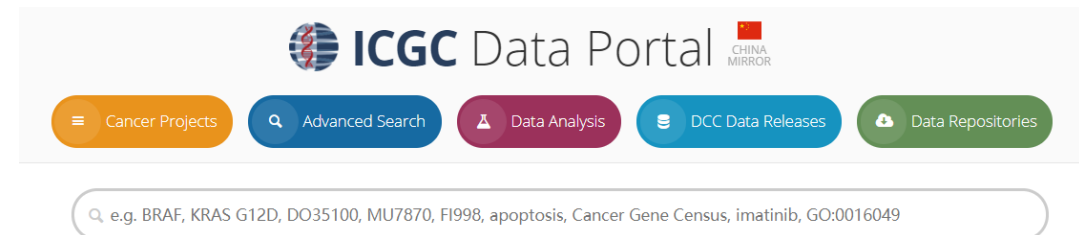
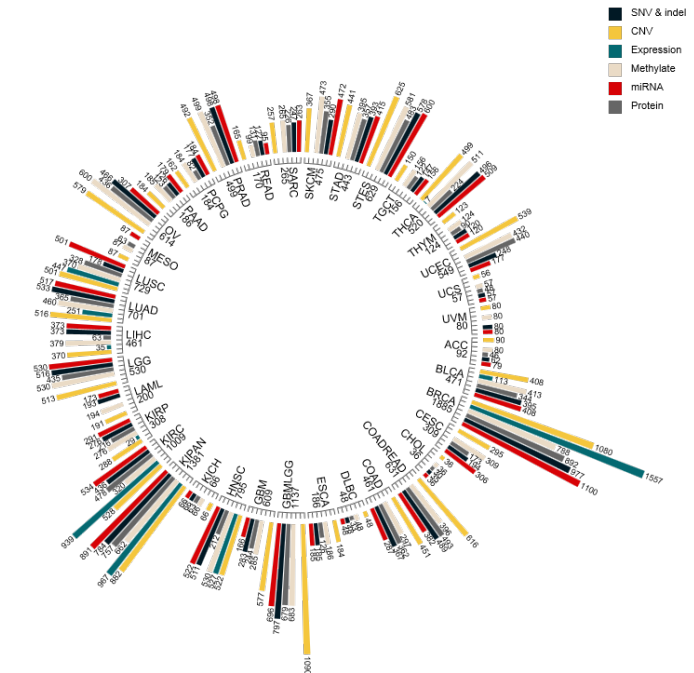
Function:

- Based on ACMG dynamic interpretation function Modul
- Integrating multiple cancer databases, such as CNGB, ICGC, TCGA
- Covering the main organs : lung, liver, stomach, brain, etc.

Data:

- 69 projects
- 27,044 individuals
- 39,212 samples
- 24.7GB result data
- 9,823,462 variants
- 37 cancer types (incl. subtypes)

Not only a database, but also an analysis and solution platform



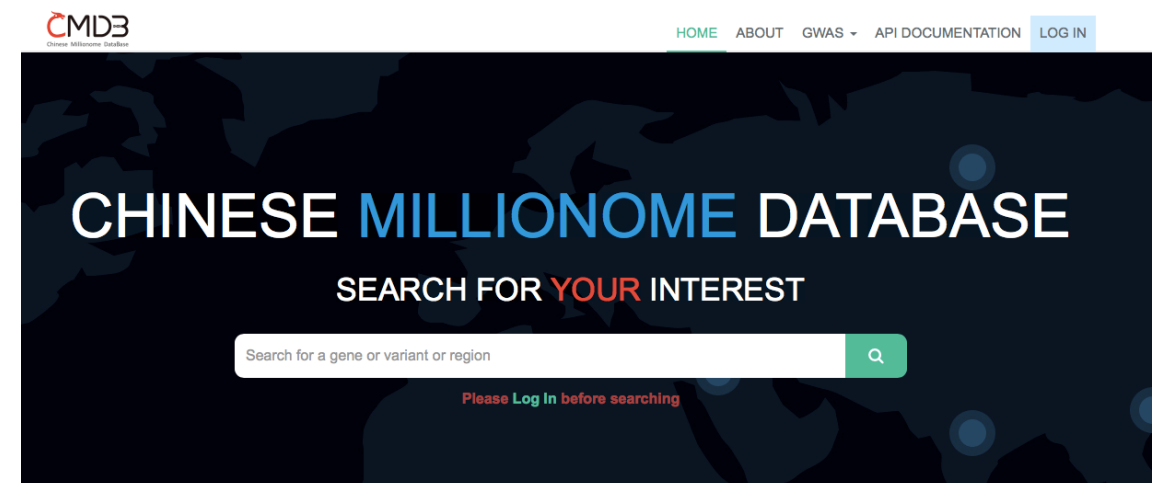
Data sources : BGI, CNGB, ICGC, TCGA, MSK-IMPACT,,

CNGB's Approach to Sample and Data Sharing - CNGBdb

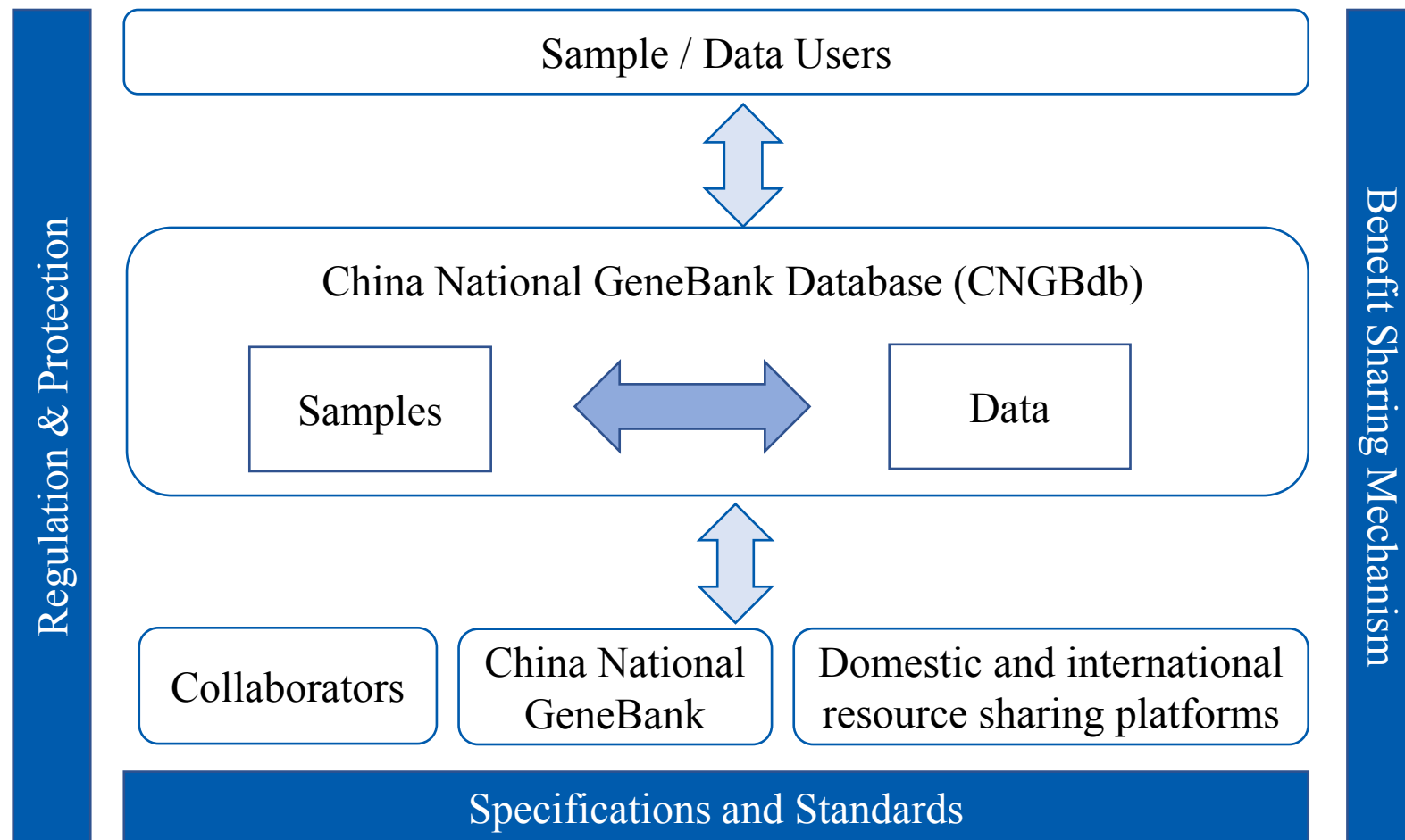
Chinese Millionome Database (CMDDB)

-- Supporting publication while protecting human genetic resources

- The CMDDB delivers variation information and scientific insights derived from the analysis of millions of Chinese sequencing data, and promotes genetic research and precision medicine in China.
- Info: detected variants and the corresponding allele frequency, annotation, frequency comparison to the global populations from existing databases, etc.
- Data are archived **ONLY** in CNGBdb. Data are kept within the border.
- Archiving, analysis of omics data with controlled access.



CNGB's Approach to Sample and Data Sharing – Sharing Mechanism

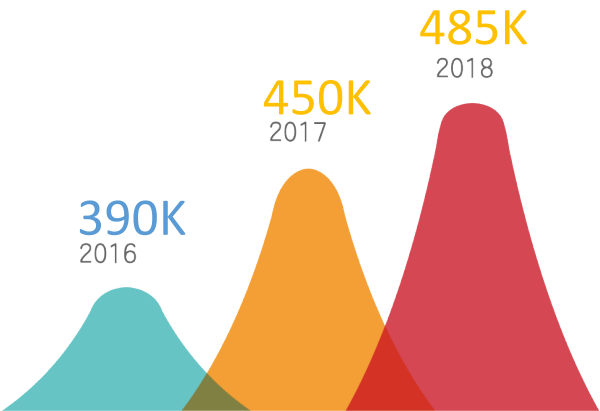


- The portal links sample / data users and holders.
- Info of samples and related data (e.g. omics) shared in the data portal.
- Samples collected by CNGB, by collaborators and samples on other sharing platform.
- Facilitated by clarified specifications and standards.
- Protected by regulation and benefit sharing mechanism.

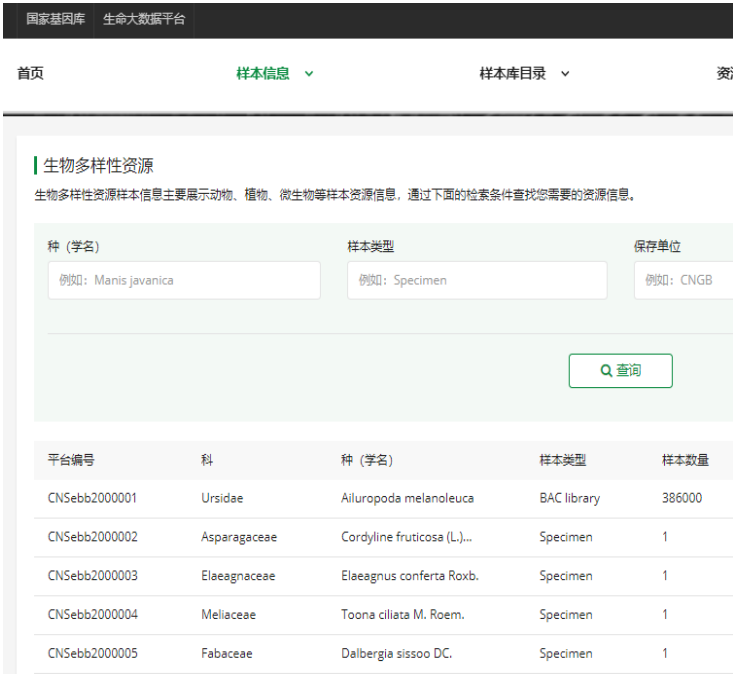
CNGB’s Approach to Sample and Data Sharing – E-Biobank

E-BioBank (EBB)

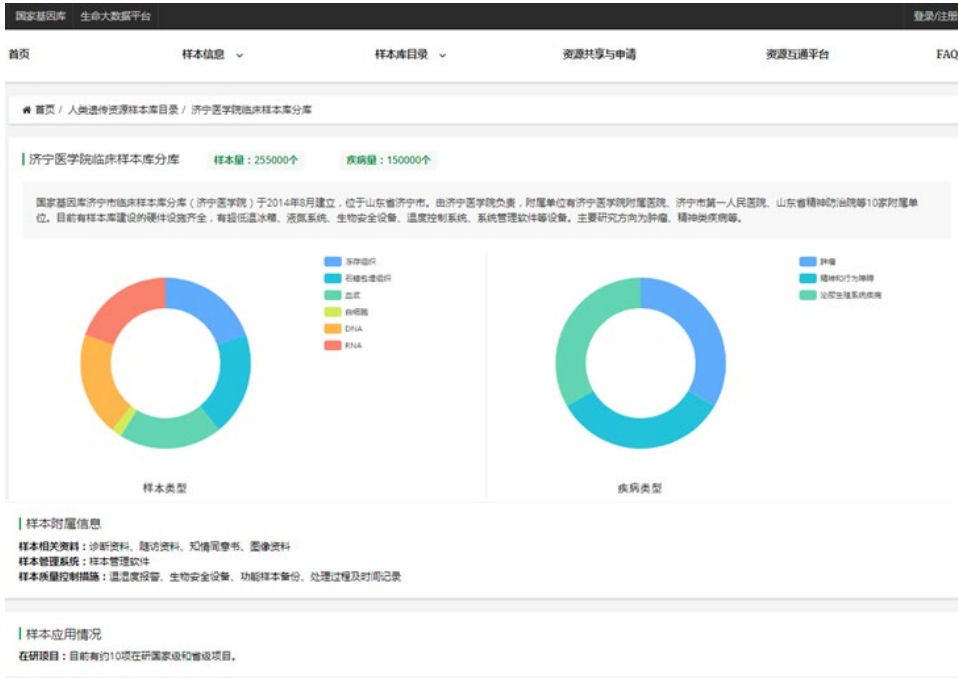
- Data portal for sample sharing
- Build **bridges** between sample holders and sample users
- Creates an open and fair environment for sharing of biological samples



485k samples / 5.5k species



Shared sample information



Online directory of biobanks

CNGB's Approach to Sample and Data Sharing - E-Biobank

生物多样性资源

生物多样性资源样本信息主要展示动物、植物、微生物等样本资源信息，通过下面的检索条件查找您需要的资源信息。

1. Search target sample

种 (学名)
例如: Manis javanica

样本类型
例如: Specimen

保存单位
例如: CNGB

项目名称
例如: Ruili botanical garden project

Q 查询

平台编号	科	种 (学名)	样本类型	样本数量	保存单位	项目名称	关联组学数据
CNSebb2000001	Ursidae	Ailuropoda melanoleuca	BAC library	386000	CNGB	Gaint Panda BAC library...	-
CNSebb2000002	Asparagaceae	Cordyline fruticosa (L.)...	Specimen	1	CNGB	Ruili botanical garden p...	CNShis0046812
CNSebb2000003	Elaeagnaceae	Elaeagnus conferta Roxb.	Specimen	1	CNGB	Ruili botanical garden p...	CNShis0046816

2. Detailed sample information

拥有者:
BGI

其他数据库编号: SAMN08770342

公开日期: 2019-01-30

更新日期: 2019-01-30

测序数据

项目编号	样本编号	实验编号	测序编号	物种	测序平台	文库设计	文件
CNPhis0000538	CNShis0046812	CNXhis0119000	CNRhis0123700	Cordyline fruticosa	BGISEQ-500	PAIRED	测序文件

样本库目录

想申请使用样本，或共享您的样本信息？请下载《样本需求书》或《人类遗传资源信息登记表》/《生物多样性资源信息登记表》，填写后发送邮件至平台官方邮箱：

cngb-ebb@genomics.cn，工作人员将于3个工作日内给您反馈结果。



4. Sample request

3. NGS raw data download

[上级目录]

名称	大小	修改日期
CL100025395_L01_17_1.fq.gz	8.0 GB	2018/5/11 上午8:00:00
CL100025395_L01_17_2.fq.gz	8.3 GB	2018/5/11 上午8:00:00
CL100025395_L01_18_1.fq.gz	7.0 GB	2018/5/11 上午8:00:00
CL100025395_L01_18_2.fq.gz	7.1 GB	2018/5/11 上午8:00:00
CL100025395_L01_19_1.fq.gz	7.7 GB	2018/5/11 上午8:00:00
CL100025395_L01_19_2.fq.gz	8.1 GB	2018/5/11 上午8:00:00
CL100025395_L01_20_1.fq.gz	6.8 GB	2018/5/11 上午8:00:00
CL100025395_L01_20_2.fq.gz	7.3 GB	2018/5/11 上午8:00:00

CNGB's Approach to Sample and Data Sharing – Sharing Platform



国家人类遗传资源共享服务平台

National Human Genetic Resource Sharing Service Platform

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资源专题
资源检索
资源统计
共建单位

恶性肿瘤专题

鼻咽癌遗传资源库			
标识符	B0110	访问限制	公开级
关键词	鼻咽癌；全血；血浆；血细胞		
负责单位信息			
负责单位名称	深圳国家基因组		
负责单位通讯地址	深圳市大鹏新区大鹏街道金沙路国家基因组		
负责单位电子邮件	cngb-ebb@genomics.cn	负责单位联系电话	0755-33945516
合作单位			
深圳国家基因组			
其他信息			

- 综合性肿瘤病理遗传资源库
（山东大学第二医院）
- 恶性肿瘤遗传资源库（济南市中心医院）
- 遗传性肿瘤家系遗传资源库
- 综合性肿瘤遗传资源库（山东中医药大学附属医院）
- 消化道肿瘤遗传资源库
- 肝癌遗传资源库
- 食管癌遗传资源库（东南大学附属中大医院）

CNGB listed in biobank catalog of the National Human Genetic Resources Sharing Service Platform











RESULTS OVERVIEW

235 records found (unique samples, not counting multiple samples from the same specimen).

Your search:

Repository

Show entries

Scientific Name	Country	Record No.	Repository	Type
<i>Aegithalos caudatus</i>	KR	B10K-DU-002-10	CNGB	DNA
<i>Alectura lathamii</i>	AU	B10K-DU-001-39-DNA2	CNGB	DNA
<i>Alectura lathamii</i>	AU	B10K-DU-001-39	CNGB	DNA

Information of samples are shared via GGBN's portal



中国科学院植物研究所
中国科学院昆明植物研究所

首页 HOME

简介 PROFILE

联系我们 CONTACT

全部 搜索

CNGB2017DF3HH0002.BACTERIA

10314 植物体来源 738 植物体来源 5560 微生物来源 0 动物体来源	植物体来源 10314 2004 4585 116 基因组 EST cDNA EST EST EST 植物体来源 738 237 201 基因组 EST cDNA	微生物来源 5560 357 4040 基因组 EST EST 动物体来源 0 基因组 EST EST
--	---	---

植物体来源

10314
基因组

2004
EST

4585
cDNA

116
EST

植物体来源

738
基因组

237
EST

201
cDNA

微生物来源

5560
基因组

357
EST

4040
EST

动物体来源

0
基因组

0
EST

0
EST

样本ID: CNGB2017DF3HH0002

保存单位: CNGB

样本状态: Available

属: Bacilli

科: Streptococcaceae

属: Streptococcus

模式生物属: Bacteria

鉴定方式:

宿主: Human feces

保存条件: glycerol

细胞培养温度: 37℃

来源: chongzhen

测序: Illumina

测序数据: SRR11580154

基因组组装: 有 (1x1)

GenBank Accession ID:

项目描述:

项目来源:

项目联系人: 中国科学院昆明植物研究所

项目地址: CHN0001380 CHN0001381 CHN0001382 CHN0001383

样本名称: 10314

产品用途: For Proteomics

来源: Lactobacillus

组织:

种: Streptococcus salivarius subsp. salivarius

细胞:

生物组织:

培养温度: -80℃

培养描述: Boring body

培养基: PPG MEDIUM

国家: China

名称: jianfeng

分类群: Human feces

测序:

测序数据源:

测序单位:

测序地址: 中国科学院昆明植物研究所

Information of **16,612** samples are shared via Biological Resources Service Network Initiative, BRS

WDCM

WFCC-MIRCEN World Data Centre for Microorganisms

[HISTORY](#)

[NEWS](#)

[WORKSHOP](#)

[DATABASE](#)

“

The WFCC-MIRCEN World Data Centre for Microorganisms (WDCM) was set up as a data center of the World Federation for Culture Collections (WFCC). The WDCM is a vehicle for networking microbial resource centers of various types of microbes. It also serves as an information resource for the customers of the microbial resource centers.

”

Collaboration with WDCM

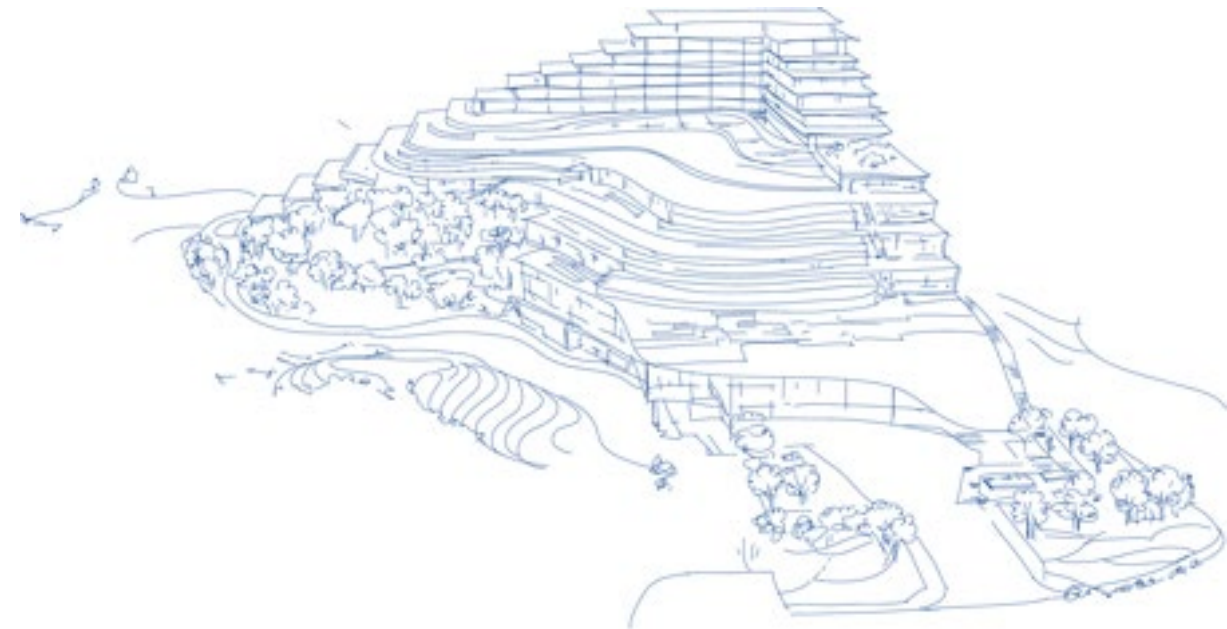
CNGB's Approach to Sample and Data Sharing -- prospect

- Better sharing → more sample / data utilization → more knowledge output
- Looking for more collaboration with other biobanks and databases
- Build a network of biobanks and databases to create better sharing mechanism
- Promote life science development for better life and better society



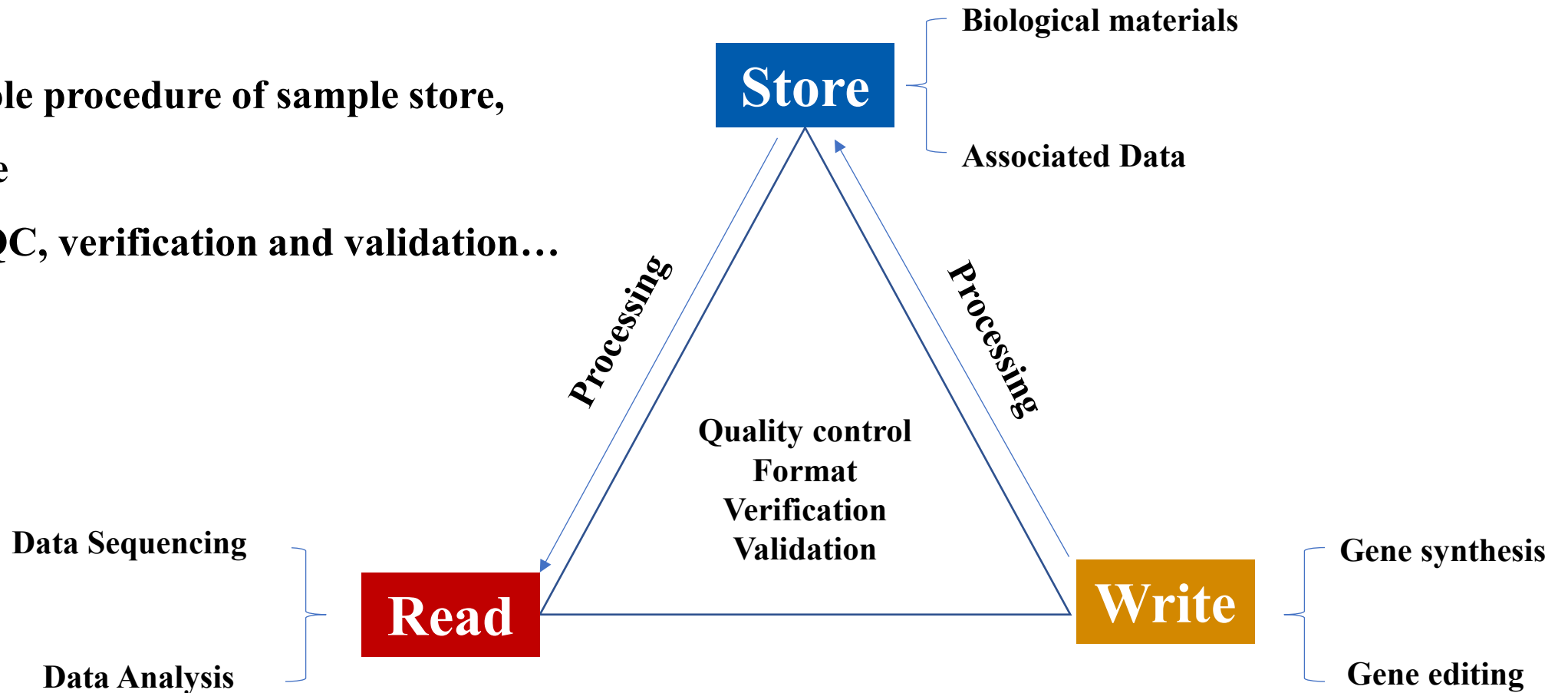
CONTENT

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Standardization – CNGB Standard Framework

- Following the framework in standard development
- Including whole procedure of sample store, read and write
- Considering QC, verification and validation...



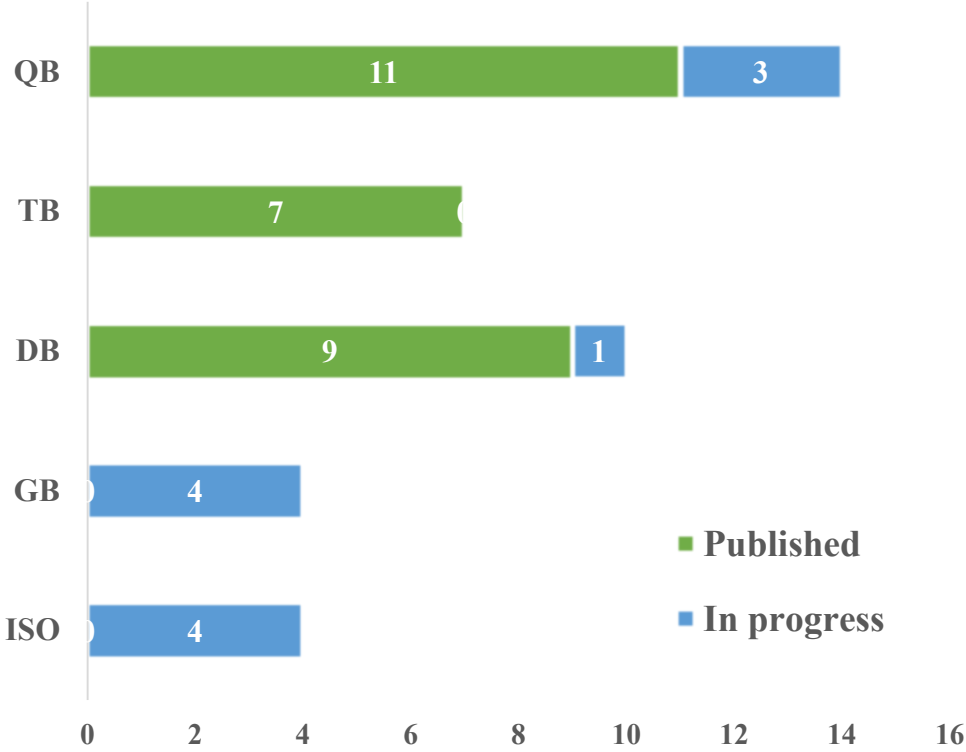
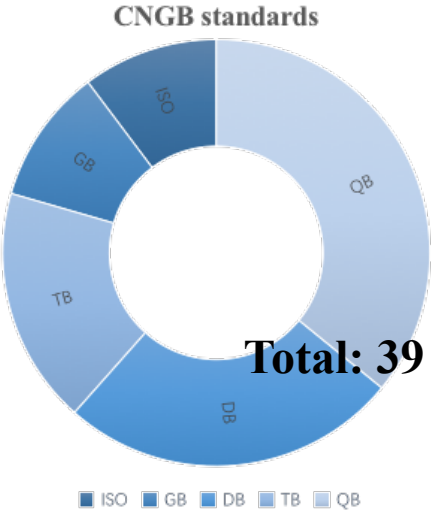
Standardization – CNGB Activities

TC participation

- International: 2 ISO/TC
- National: 2 SAC/TC

Standards involved

- 4 ISO projects
- 4 National projects
- 10 Provincial standards
- 7 Group standards
- 14 Enterprise standards



Standardization – ISO Participation

ISO/TC276 - Biotechnology

- Joined in 2013, when TC founded
- One of the mirror committee organizations in China

ISO/TC 276 N 442

国家标准化管理委员会办公室文件

标委办外〔2013〕175号

国家标准委办公室关于承担国际标准化组织 /生物技术技术委员会（ISO/TC276） 国内技术对口单位有关事项的批复

中国食品发酵研究院、深圳市市场监督管理局：
中国食品发酵研究院《关于拟承担国际标准化组织“生物技术”标准化技术委员会（ISO/TC276）P成员中国技术归口单位的申请书》和《深圳市市场监督管理局关于申请由深圳市标准技术研究院和深圳华大基因研究院联合承担ISO/TC276国内技术对口单位的请示》（深市监〔2013〕556号）收悉。经研究，同意我国以P成员身份参加国际标准化组织/生物技术技术委员会（ISO/TC276）。鉴于ISO/TC276工作范围较广，为发挥各相关方的优势，协同做好国

RESOLUTIONS ADOPTED BY THE TECHNICAL MANAGEMENT BOARD IN 2018

TECHNICAL MANAGEMENT BOARD RESOLUTION 83/2018

Adopted by correspondence on 2018-07-26

Appointment of Technical Committee Chairs (July 2018)

The Technical Management Board,
Appoints the following chairs of the respective technical committees for the term as indicated below;

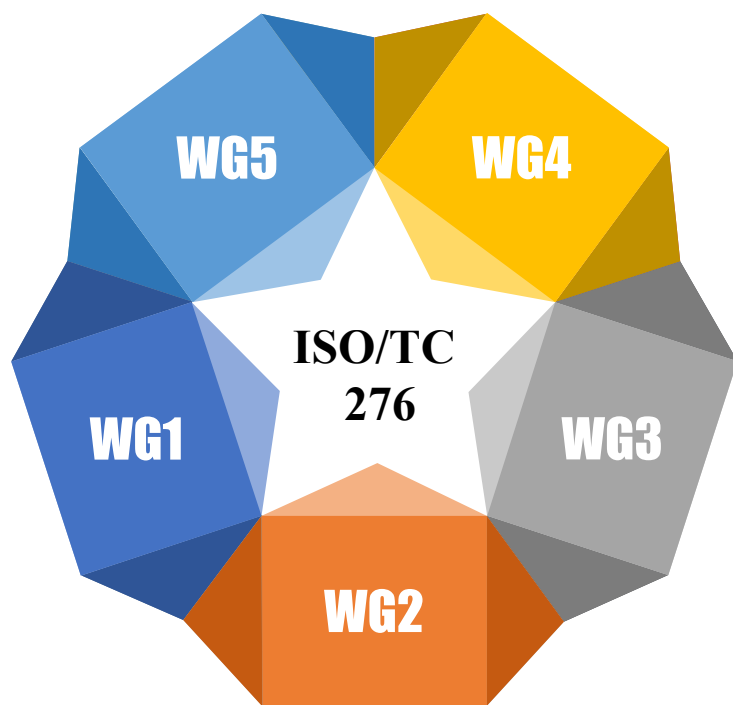
Nomination Vice-Chair (Twinning with DIN)

ISO/TC 276, Dr. Xun XU (SAC) 2018-2021

Mirror Committee Remarks of SAC

TMB resolution of Vice Chairperson

Standardization – Participation in ISO/TC276



WG2: Biobanks and bioresources

- ISO/AWI 20388 The collection, processing, transportation and storage requirements for animal biological materials
- ISO/AWI 23105 The collection, processing, transportation and storage requirements for plant biological materials

WG3: Analytical methods

- ISO/PWI 23511 General guidance of cell line authentication

WG5: Data processing and integration

- New proposal General Requirements for Metagenomics Data Processing

Standardization — Participation in SAC/TC559 & TC387

SAC/TC559 Bio-Specimen & TC387 Biochemistry Products and Testing Technology

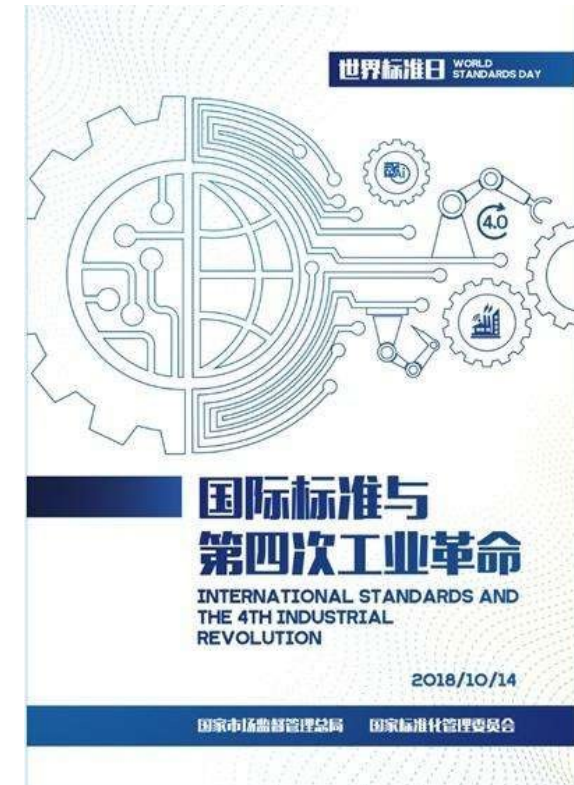
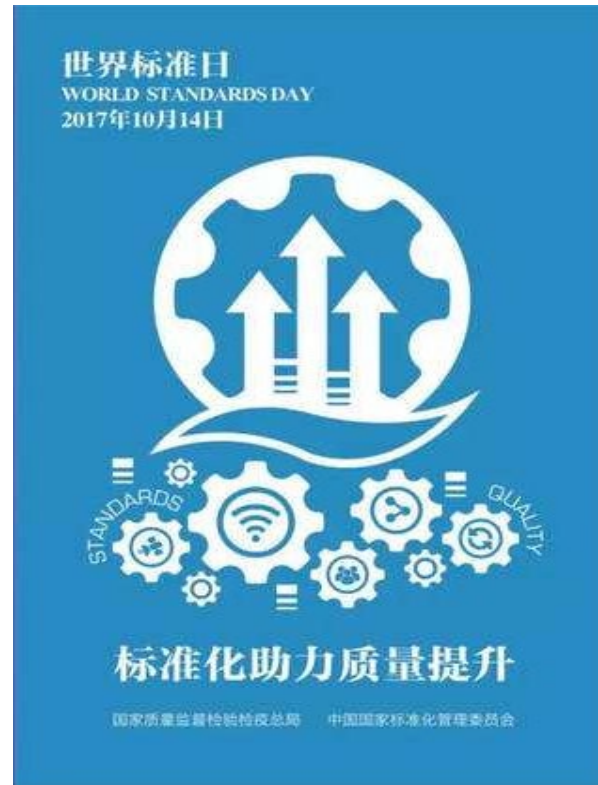
- Member of SAC/TC 559&TC 387
- Lead and participate several biobank related national standards

No.	Title
GB/T 34798-2017	Formats specifications of nucleotide sequence database
20184422-T-469	尿液样本采集与处理操作规范
20162695-T-424	合成基因质量评价通则
20184467-T-469	哺乳动物细胞交叉污染检测方法通用指南



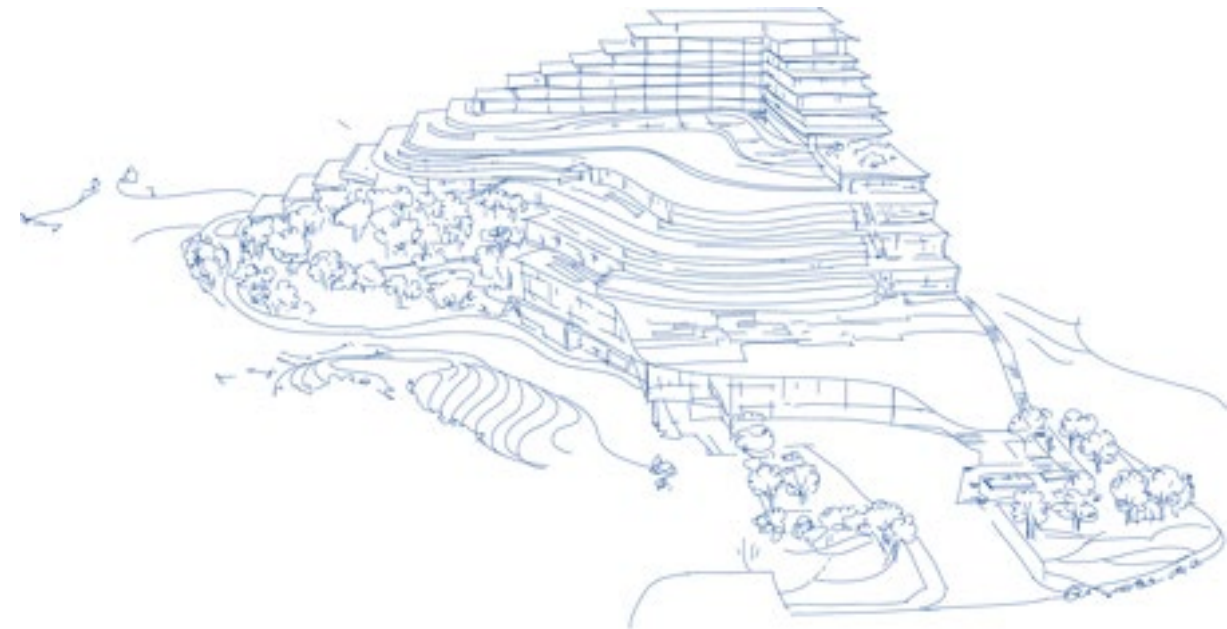
Standardization – Prospect

- Standardize biobank management and operational procedures
- Share best practices with other biobanks to achieve “One standard one test accepted everywhere”
- Continue to support genomic studies and build international standards



CONTENT

1. Biobanks in China
2. CNGB's Approach to Sample and Data Sharing
3. Standardization
- 4. Conclusion**



Conclusion

We need:

- Establish more integrated and structured biobank network throughout China for better data and sample sharing
- Synergy in standards development on international stage
- Increase interoperability for data and sample processing among biobanks
- Partner with ISBER to develop best practices

Owned by All, Done by All, Shared by All.



<https://db.cngb.org/>



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THANKS

