The Global Microbial Big Data Cooperation

Juncai MA
World Data Center for Microorganisms (WDCM)
WDCM: A world leading data center of microorganisms
Our Work

- Defining namespace for GCM

Classes: Compound, Enzyme, GO, Gene, Genome, Glycan, KeggDisease, KeggDrug, KeggGene, KeggKO, PDB, Pathway, Pfam, Protein, Pubmed, Reaction, Taxonomy

Properties: KOID, accession, accessionNum, belongTo, bioProject, class, composition, compoundId, definition, diseaseId, drugId, enzymeId, equation, exactMass, formula, geneEnd, geneId, geneOrient, geneStart, geneType, genomeId, glycanId, goId, history, keggGeneId, locusTag, mass, molWeight, organism, pathwayId, pdbId, pfamId, pmid, product, project, proteinId, reactionId, status, substrate, symbol, sysname, taxonId, toStrain, xCompound, xDisease, xDrug, xEnzyme, xGO, xGene, xGlycan, xKO, xKeggGene, xPDB, xPfam, xProductCompound, xProtein, xProteinAcc, xPubmed, xReaction, xSubstrateCompound

**Class: gcm:Genome**

Genome – 基因组

URI: [http://gcm.wdcm.org/gcm/Genome](http://gcm.wdcm.org/gcm/Genome)

Properties include: gcm:genomeId, gcm:organism, gcm:project, gcm:bioProject, gcm:status, gcm:toStrain

Used with: gcm:belongTo
通过RDF数据寻找大肠杆菌物种与pathway（Fructose and mannose metabolism 果糖和甘露糖代谢途径）的关联关系。可以从图中看到大肠杆菌物种与此pathway有直接的关联。另外，大肠杆菌下面的多个亚种也跟此pathway有关联。
Global Study Map
For the strain of
KCTC 2955

Clickable soon
World Directory of Culture collections

710 culture collections from 72 countries

By September 1, 2016
### Global Catalogue of Microorganisms

#### Formats to display the search results

<table>
<thead>
<tr>
<th>List by Strain Name</th>
<th>Strain Number</th>
<th>List by CCs</th>
<th>List by Isolation Sources</th>
<th>Species Info</th>
<th>Map View</th>
</tr>
</thead>
</table>

#### Search results

- BCC, Thailand (43)
- BCCM-LMG, Belgium (34)
- CCARM, Korea (1)
- CECT, Spain (13)
- CGMCC, China (128)
- CIRM-Levures, France (3)
- CVCM, Venezuela (11)
- DSMZ, Germany (50)
- IP, France (93)
- ITDI, Philippines (5)
- JCM, Japan (29)
- KCTC, Korea (50)
- KEMB, Korea (16)
- LIPIMC, Indonesia (4)
- MCC-MNH, Philippines (4)
- NBRC, Japan (65)
- PNCM, Philippines (19)
- TISTR, Thailand (4)
- UPCC, Philippines (2)
- UPMC, Malaysia (4)
- VKM, Russia (57)
- VTCC, Vietnam (44)

#### Filtering search result and customizing the output format

- **RELINE BY**
  - **COLLECTIONS**
    - Asia
    - Africa
    - America
    - Antarctica
    - Europe
    - Oceanica
  - **TEMPERATURE**
    - 0°C to 99°C
  - **ORGANISM TYPE**
  - **ISOLATED FROM**

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**Link to Species page**
Analyzer of Bio-resources Citation

-- An data mining tools to trace and explore utilization of microbes

BRCs distribute many microbial strains per year.

It is our great contributions from WFCC collections.

How many Papers, Patents, Sequences, Genomes are published worldwide using my microbial strains?

Global contributions from the collection
## Some Numbers for GCM

<table>
<thead>
<tr>
<th>Countries and regions</th>
<th>Africa: 2</th>
<th>America: 9</th>
<th>Asia: 13</th>
<th>Europe: 18</th>
<th>Oceania: 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Culture Collections</td>
<td>Africa: 2</td>
<td>America: 20</td>
<td>Asia: 43</td>
<td>Europe: 37</td>
<td>Oceania: 1</td>
</tr>
<tr>
<td>Strains</td>
<td>Bacteria: 45%</td>
<td>Fungi: 52%</td>
<td>Others: 3%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>368,982</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

35 collections have no online catalogue before they joined GCM

### Great Contributions From 103 collections

- **Papers**: 75,574
- **Patents**: 61,114
- **Sequences**: 272,206
- **Genome**: 1,598
WDCM : an information infrastructure for the exploration and utilization of microbial strains preserved worldwide
GCM provide services for CBD national focal points
A global information platform for accessing, tracking, monitoring and benefit sharing of microbial resources

COP 12 in Korea, Sep 2014
CBD Side Event

Dr. Juncai MA: Director of WDCM

GCM: A global information platform for accessing, tracking, monitoring and benefit sharing of microbial resources

Prof. Christopher H. C. Lyal:
The Natural History Museum, U.K

Linking the Access and Benefit Sharing Clearing House and user sector databases: a test case to maximise legal certainty and information provision using the Global Catalogue of Microorganisms

Discussion
截至2016年9月，Nagoya Protocol on Access and Benefit-sharing：77 Parties (83 Ratifications) (92 Signatures)

议定书于2010年10月29日通过，2014年10月12日生效。中国于2016年6月8日加入议定书。议定书将于2016年9月6日起对中国生效，暂不适用于香港和澳门特别行政区。
**Pandemic Influenza Preparedness Framework** for the sharing of influenza viruses and access to vaccines and other benefits

194 Member States joined
ISO TC 276 Biotechnology

Creation date: 2013
Secretariat: DIN
Participating Countries: 25
Observing Countries: 14

<table>
<thead>
<tr>
<th>WG</th>
<th>Title</th>
<th>Convener /Co-convener</th>
</tr>
</thead>
<tbody>
<tr>
<td>WG1</td>
<td>Terminology</td>
<td>Dr. Pablo Serrano (DE)</td>
</tr>
<tr>
<td>WG2</td>
<td>Biobanks and bioresources</td>
<td>Dr. Georges Dagher (FR)/ Yong Zhang (CN)</td>
</tr>
<tr>
<td>WG3</td>
<td>Analytical methods</td>
<td>Dr. Sheng Lin Gibson (US)</td>
</tr>
<tr>
<td>WG4</td>
<td>Bioprocessing</td>
<td>Tatsuo Heki (JP)</td>
</tr>
<tr>
<td>WG5</td>
<td>Data processing and integration</td>
<td>Martin Golebiewski (DE)/ Yong Zhang (CN)</td>
</tr>
</tbody>
</table>
## 10 projects in preliminary stage were registered in ISO/TC 276 Work Program

<table>
<thead>
<tr>
<th>PWI No.</th>
<th>Project Title</th>
<th>WG</th>
<th>Proposer</th>
</tr>
</thead>
<tbody>
<tr>
<td>PWI 20386</td>
<td>Inventory development of existing standards, and other relevant documents related to ISO/TC 276</td>
<td>1</td>
<td>Dr. Pablo Serrano (DE)</td>
</tr>
<tr>
<td>PWI 20387</td>
<td>Biobanking-general requirements for biobanks</td>
<td>2</td>
<td>Dr. Georges Dagher (FR)</td>
</tr>
<tr>
<td>PWI 20390</td>
<td>Collection, processing, storage and transportation technology criteria for animal germplasm</td>
<td>2</td>
<td>Yong Zhang (CN)</td>
</tr>
<tr>
<td>PWI 20388</td>
<td>Collection, processing, conserving and transportation criteria for human genetic resources</td>
<td>2</td>
<td>Dr Xiaomin Wang (CN)</td>
</tr>
<tr>
<td>PWI 20389</td>
<td>Methods to determine the concentration of total nucleic acids</td>
<td>3</td>
<td>Dr Fay Betsou (BE)</td>
</tr>
<tr>
<td>PWI 20396</td>
<td>Method to evaluate the quality of massive sequencing data</td>
<td>3</td>
<td>Yong Zhang (CN)</td>
</tr>
<tr>
<td>PWI 20397</td>
<td>General definitions and requirements for the production and quality control of synthetic nucleic acids</td>
<td>3</td>
<td>Hiroki Nakae (JP)</td>
</tr>
<tr>
<td>PWI 20688</td>
<td>Methods to control bioreactor process for cell culturing</td>
<td>4</td>
<td>Tatsuo Heki (JP)</td>
</tr>
<tr>
<td>PWI 20691</td>
<td>Downstream data processing and integration workflows</td>
<td>5</td>
<td>Martin Golebiewski (DE)</td>
</tr>
<tr>
<td>PWI21710</td>
<td>Microbial resources data-specification on data management and publication in microbial resources center</td>
<td>5</td>
<td>Juncai MA (CN)</td>
</tr>
</tbody>
</table>
WDCM Symposiums and workshops

WDCM 1: May 17-18, 2011

WDCM 2: June 7-8, 2012

WDCM 3: September 26, 2013

WDCM 4: September 3, 2014

CBD Workshop May 23-25, 2013

CBD Workshop Sep 1-2, 2014
WDCM Global Nodes System

BCC in Thailand

TISTR in Thailand

VKM in Russia

UPM in Malaysia

Minho in Portugal

LIPI in Indonesia
WDCM 50 Years Anniversary

The 50th Anniversary of World Data Center for Microorganisms
6-8 September, 2016  Beijing, China
WDCM Training Courses

In Beijing, 2011

In Malaysia, 2013

In Thailand, 2014

In Beijing, 2012

In Beijing, 2014
Acknowledgement

- WFCC leadership
- Strong supports from Chinese government
- IMCAS and my team