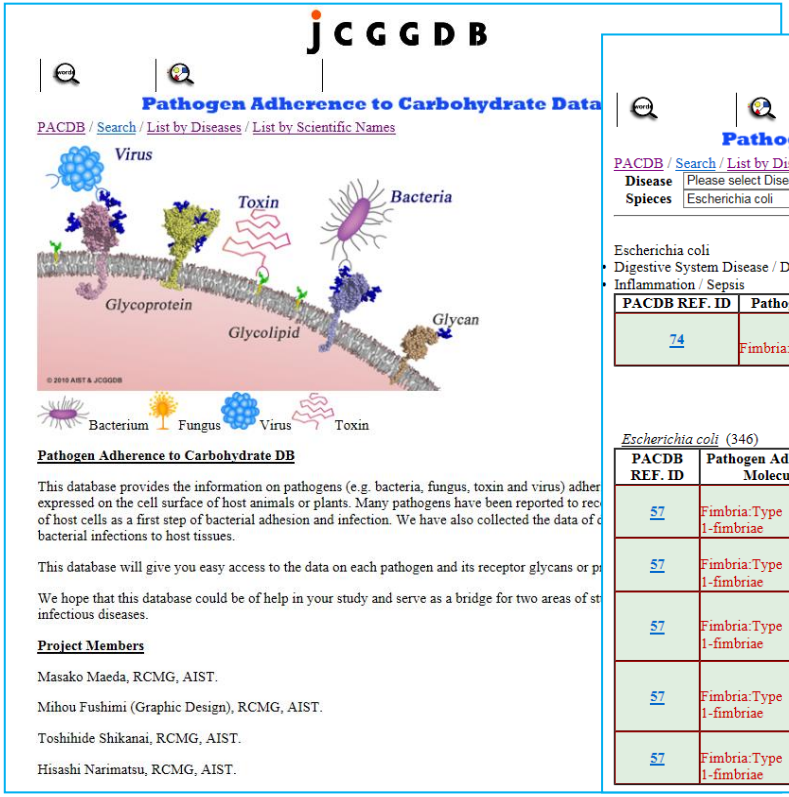
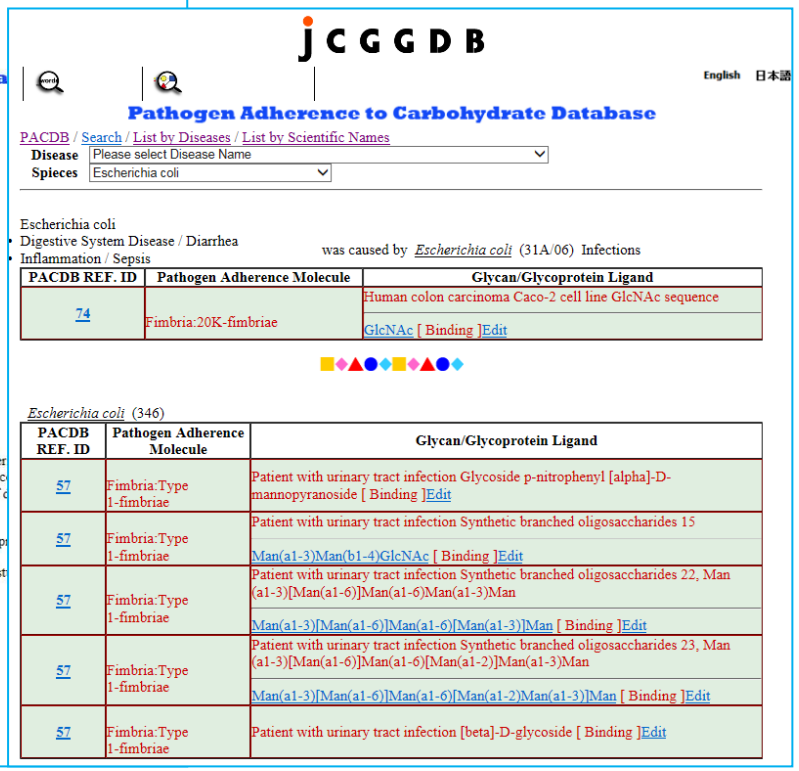
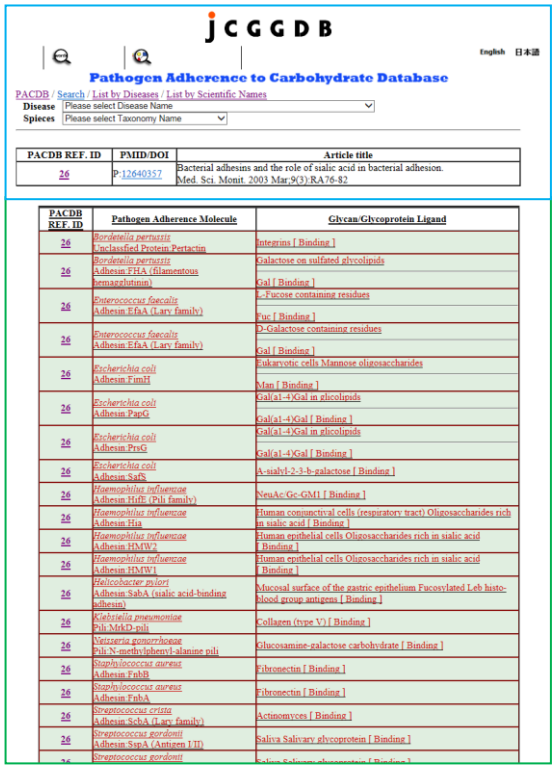
PACDB - Pathogen Adherence to Carbohydrate Database

The Pathogen Adherence to Carbohydrate Database (PACDB) was created by Research Center for Medical Glycoscience (RCMG) and released in March 2010. This database is supported by Ministry of Education, Culture, Sports, Science and Technology (MEXT) as part of “Life Science Integrated Database project”.

At present time PACDB provides information on about 370 strains of 127 microorganisms, and about 1700 lectin-glycan interactions, such as binding or not binding. Also, the PACDB provides information on 97 infectious diseases in which the interaction between adherence molecules of infectious agents and glycan ligands of the host cells plays an important role in the disease pathogenesis. All of the information for the creation of this database was obtained from the 214 scientific articles. The Web-based user interface was created and released and now available at http://jcggdb.jp/search/PACDB.cgi.

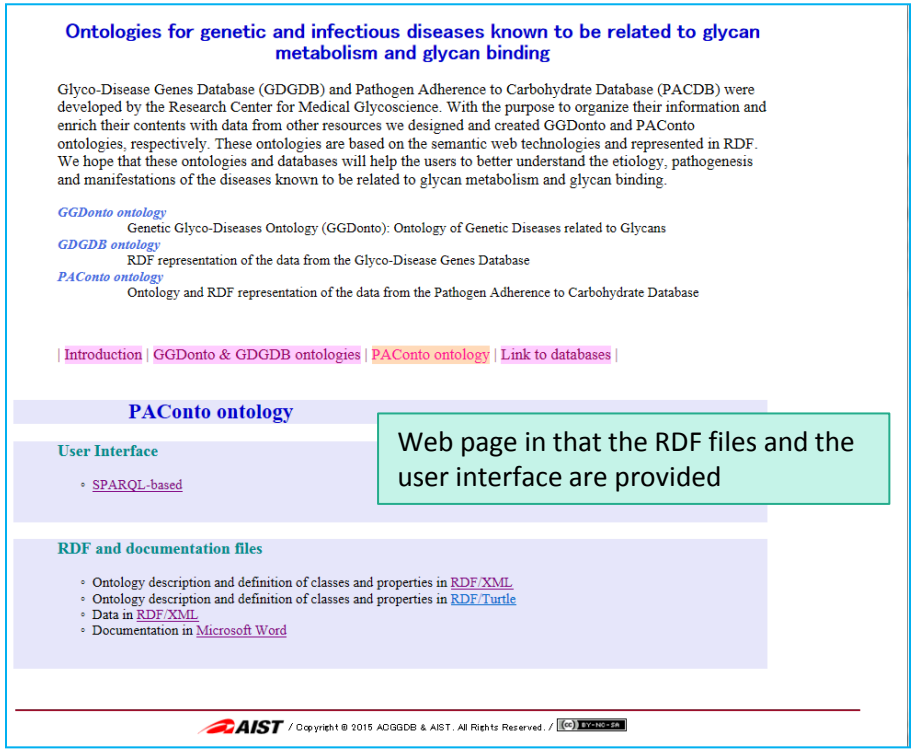






PAConto ontology - RDF representation of the PACDB data and Ontology of Infectious Diseases known to be related to Glycan Binding

The Pathogen Adherence to Carbohydrate Database (PACDB) was developed by the Research Center for Medical Glycoscience (RCMG) and released in March 2010. Being the members of the "Life-Science Database Integration Project" of National Bioscience Database Center (NBDC) of Japan Science and Technology Agency (JST), we decided to organize PACDB information and enrich its content by integration with other biomedical resources. We designed and developed the ontology, called PAConto. In addition to the ontology, we developed a system with a user interface, using which the users can retrieve and search information from PAConto. This SPARQL-based user interface and RDF files for PAConto are available at http://acgg.asia/db/diseases/pacdb. We hope that this PAConto ontology with PACDB database will help the users to better understand the etiology, pathogenesis and manifestations of the diseases known to be related to glycan binding.



Web page in that the RDF files and the user interface are provided

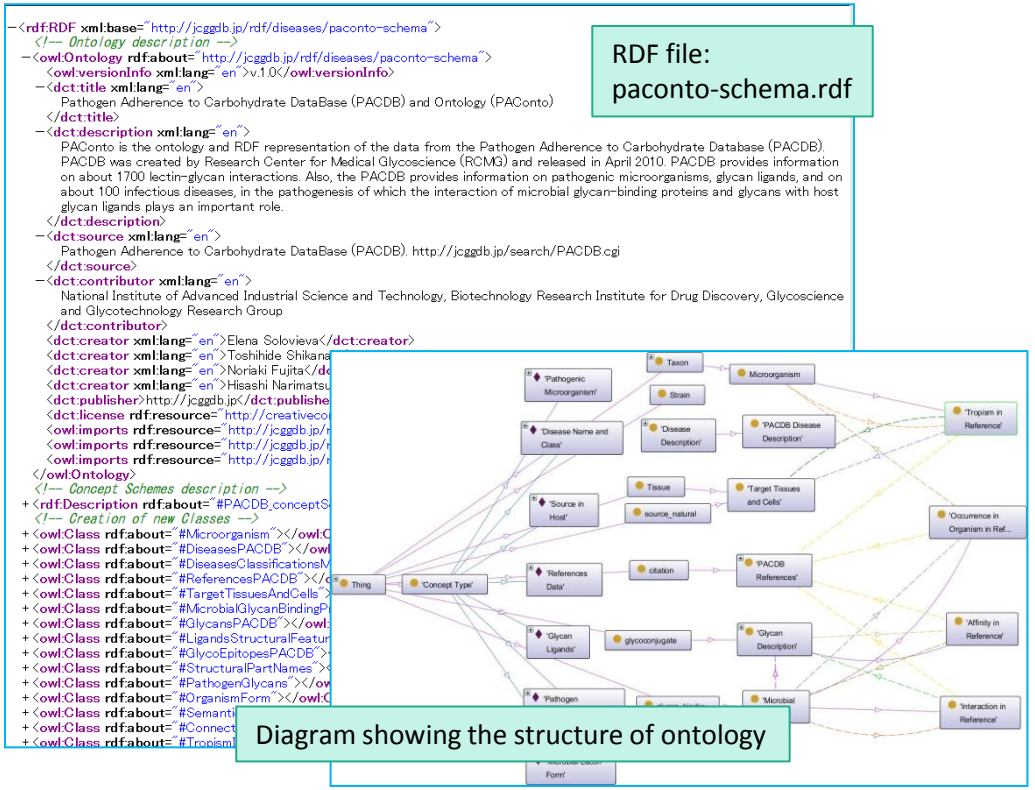


Diagram showing the structure of ontology

PAConto ontology

Internal and external sources of information

RDF representation of the PACDB data

Database provided by the AIST:
Pathogen Adherence to Carbohydrate Database

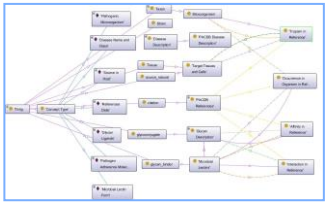
PACDB

PACDB provides information on about 120 microorganisms, and about 90 infectious diseases in which the interaction between adherence molecules of infectious agents and glycan ligands of the host cells plays an important role in the disease pathogenesis.

We designed and developed the ontology, called PAConto. This ontology is based on the Semantic Web Technologies and represented in Resource Description Framework (RDF) format. Using Semantic Web Approach with Web Ontology Language (OWL), Simple Knowledge Organization System (SKOS) and RDF standards, we described semantics of PACDB data, enriched this data with additional various classifications, and linked PACDB data with related biomedical resources.

RDF

PAConto ontology



Link information to internal and external information resources

Database provided by the AIST:
Structures and substructures of glycans

RDF

JCGGDB
(Glycan ID, Motif ID)

Internal information resources:
GlycoEpitope database

GlycoEpitope DB

External information resources:
MonosaccharideDB database

MonosaccharideDB

External information resources used to create the classifications

Scientific literature used to create the classification of Lectins

Scientific literature

Information resources used to create the classification of Diseases and Target Sources

MeSH

UMLS

NCIT

UMLS - Unified Medical Language System
MeSH - Medical Subject Headings vocabulary
NCIT - National Cancer Institute Thesaurus

Classifications

RDF

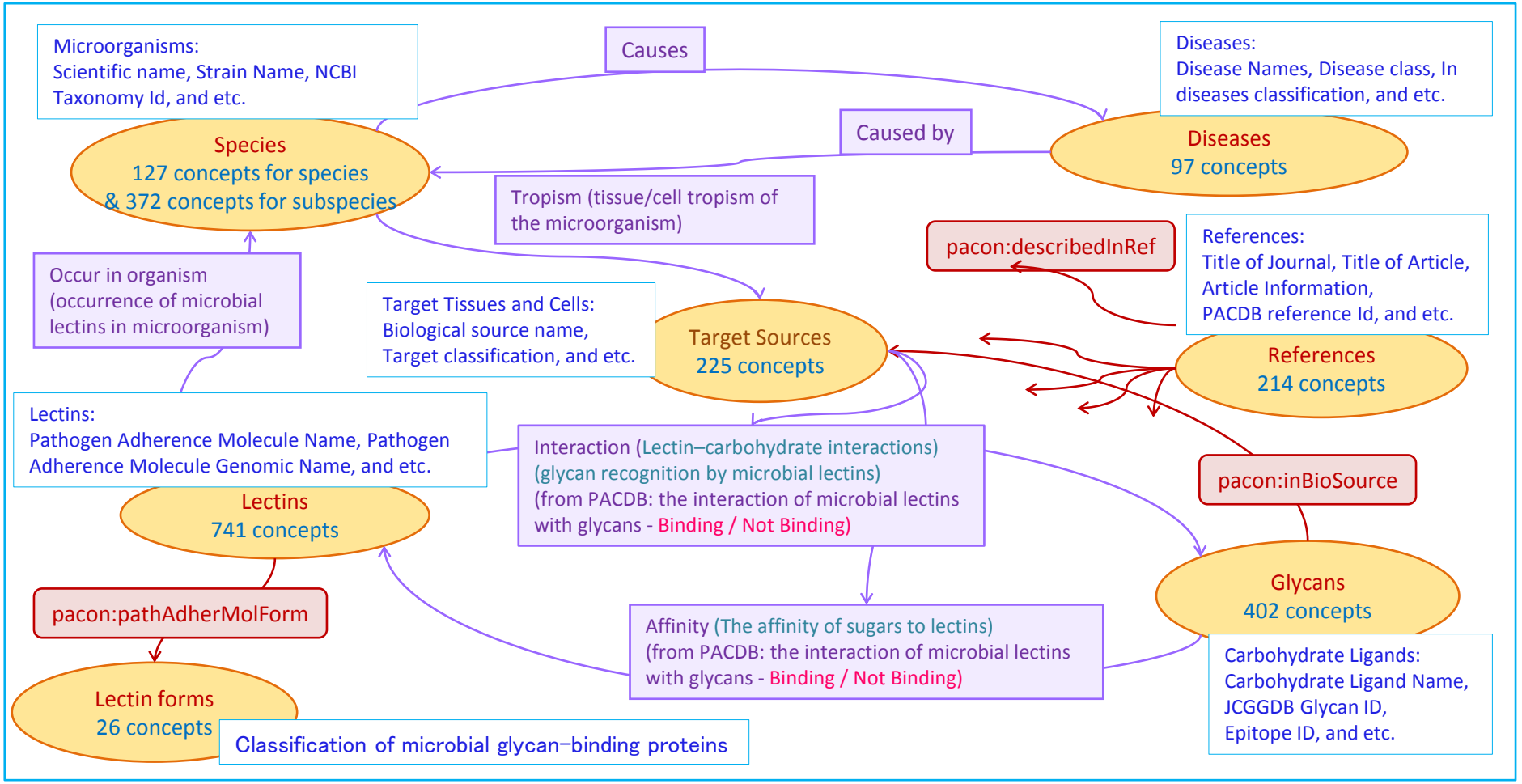
NCBI Taxonomy

PAConto ontology

Structure of the ontology

Features of this ontology

- On the basis of the scientific literature, we described semantics of PACDB data by adding various classifications, such as classifications of pathogenic microorganisms (pathogens), microbial glycan-binding proteins, target sources and host glycan ligands.
- PACDB database is the database created on the basis of the references in which the data are based on biological experiments. Since the data obtained from these experiments are numerous and complicated, PAConto ontology has the complicated structure.



Top Page of PAConto User Interface

http://acgg.asia/db/diseases/pacdb

Text searching

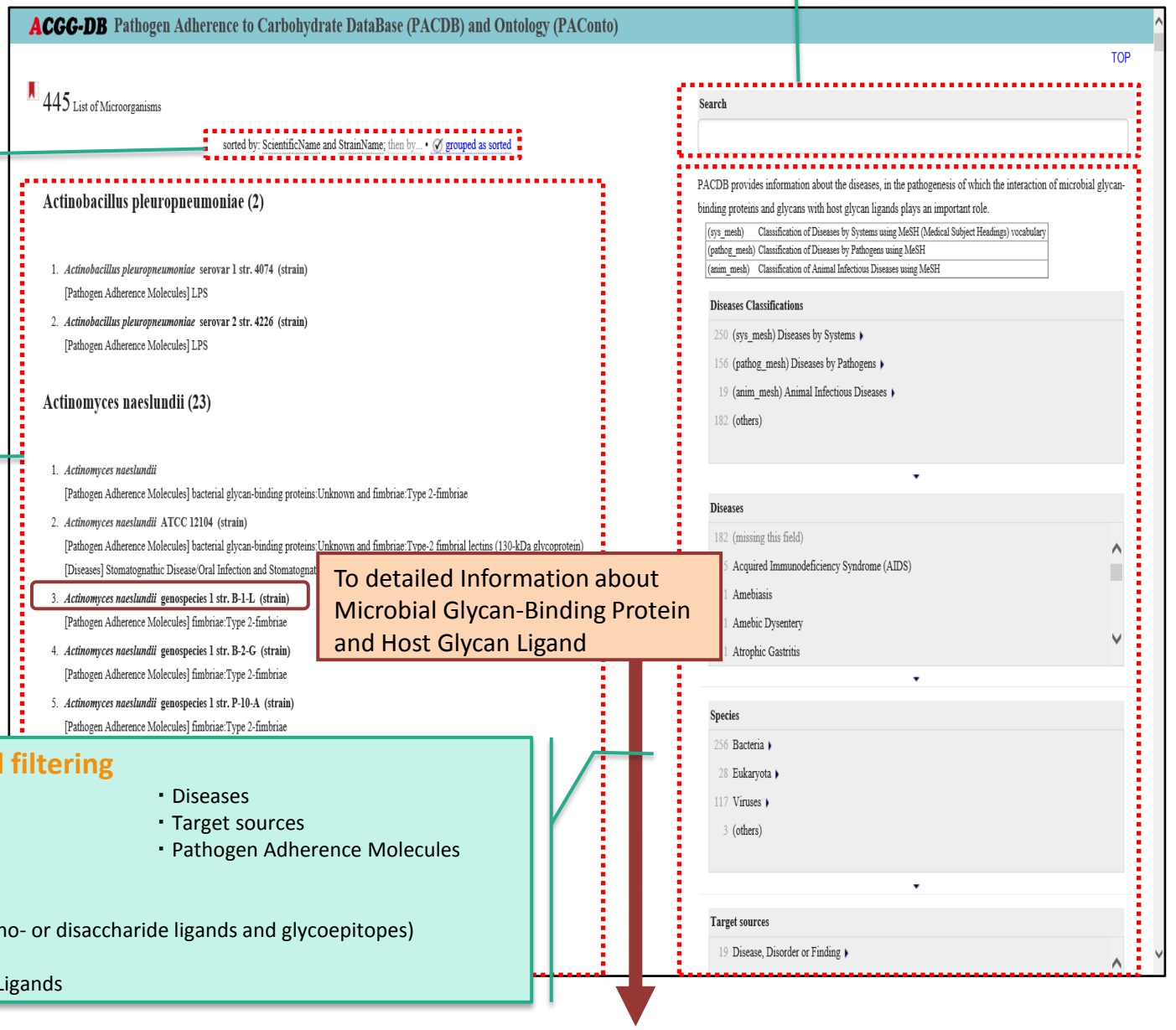
Changing the Layout of the List of Microorganisms
Menu for changing the layout of the list
Different layout of the list (grouped and ungrouped)

List of Pathogenic Microorganisms
Number of items in the list

To detailed Information about Microbial Glycan-Binding Protein and Host Glycan Ligand

Facets sets: Faceted browsing and filtering

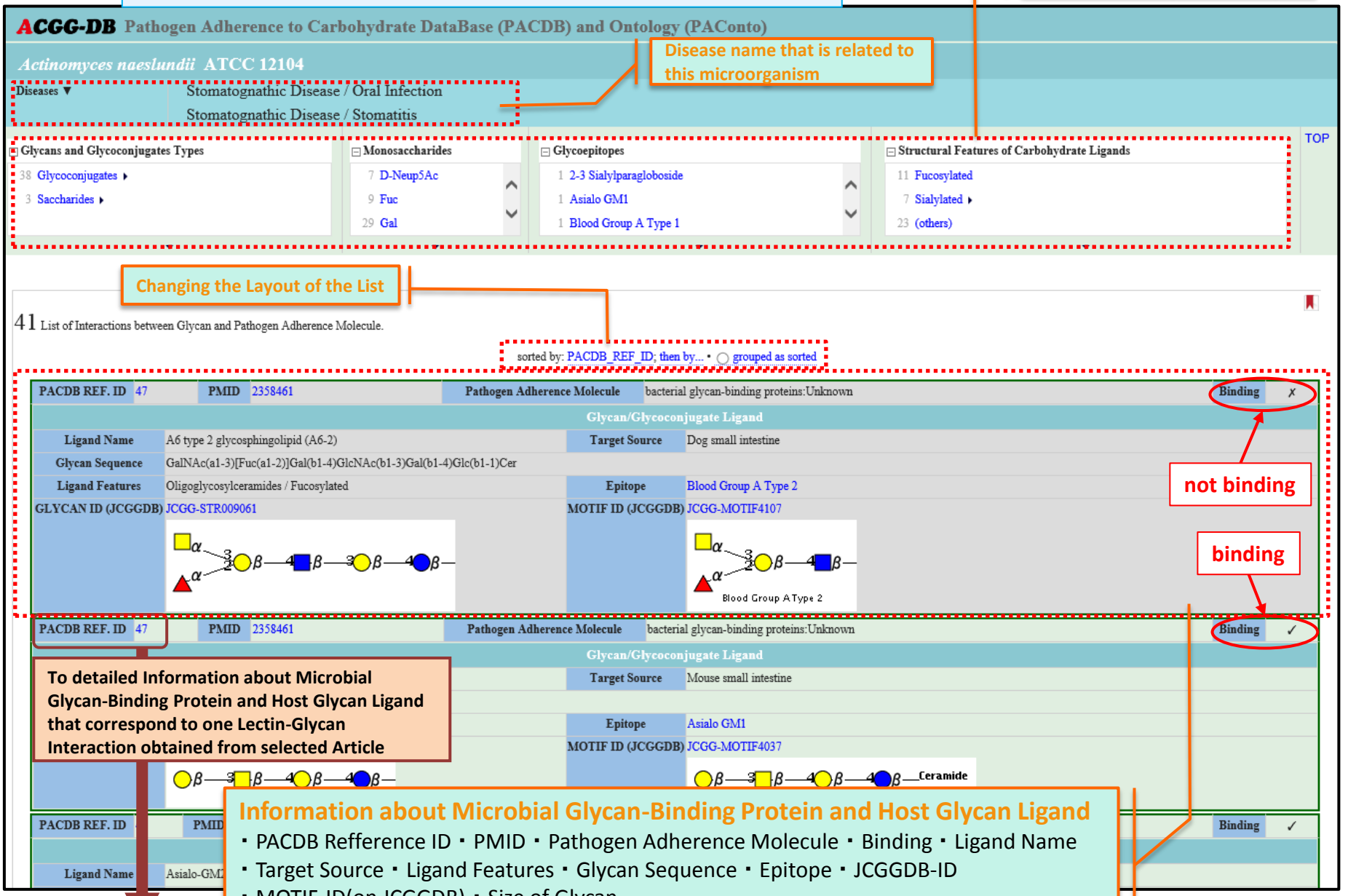
- Diseases Classifications
- Species
- Microbial Glycan-Binding Proteins Types
- Diseases
- Target sources
- Pathogen Adherence Molecules
- Glycans and Glycoconjugates Types
- Monosaccharides (mainly for the mono- or disaccharide ligands and glycoepitopes)
- Glycoepitopes
- Structural Features of Carbohydrate Ligands



JCGGDB

Detailed Information about Microbial Glycan-Binding Protein and Host Glycan Ligand that correspond to one Lectin-Glycan Interaction

Facets sets:
Faceted browsing and filtering



To detailed Information about Microbial Glycan-Binding Protein and Host Glycan Ligand that correspond to one Lectin-Glycan Interaction obtained from selected Article

Information about Microbial Glycan-Binding Protein and Host Glycan Ligand

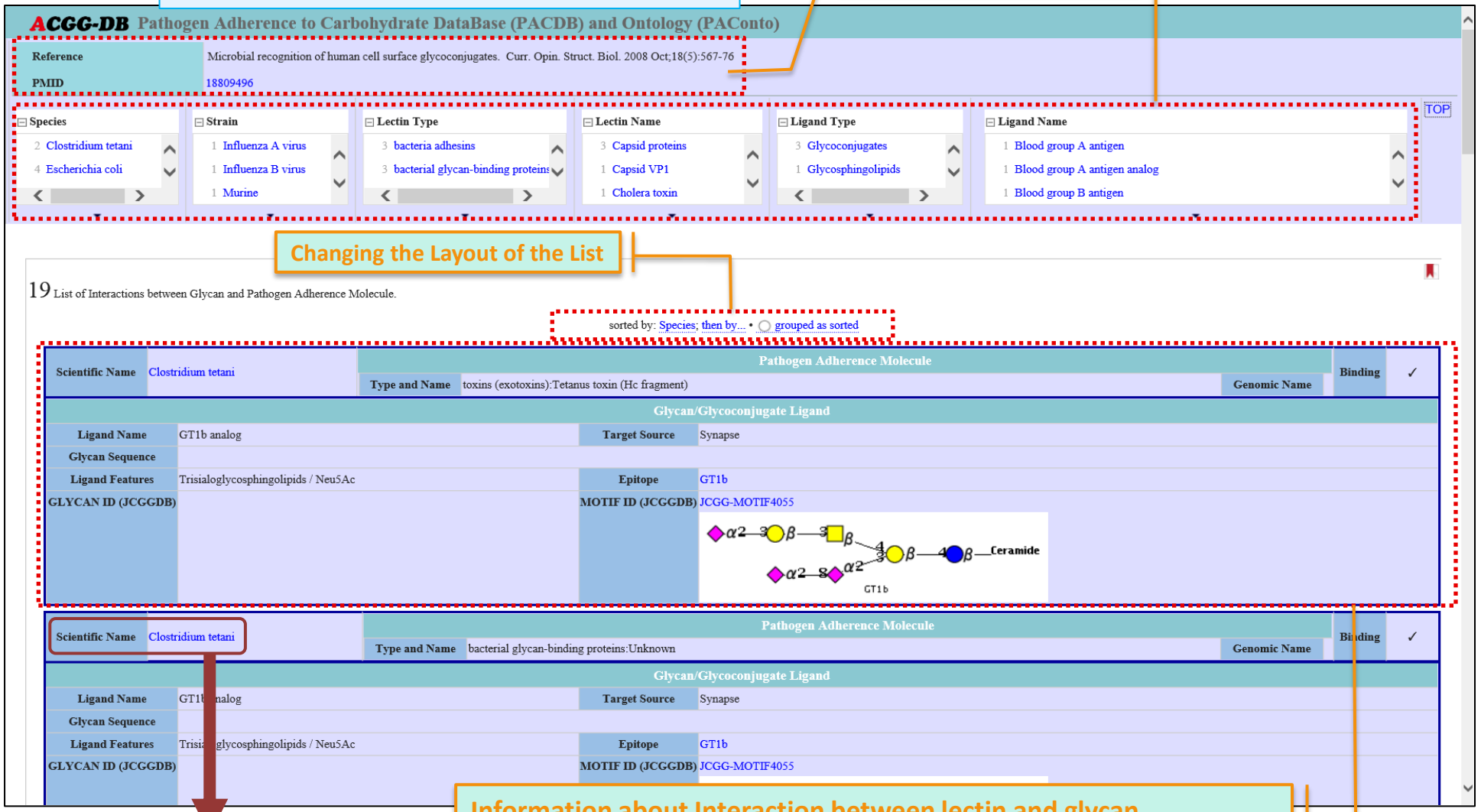
- PACDB Refference ID
- PMID
- Pathogen Adherence Molecule
- Binding
- Ligand Name
- Target Source
- Ligand Features
- Glycan Sequence
- Epitope
- JCGGDB-ID
- MOTIF-ID(on JCGGDB)
- Size of Glycan

JCGGDB

Detailed Information about Microbial Glycan-Binding Protein and Host Glycan Ligand that correspond to one Lectin-Glycan Interaction obtained from selected Article

Article Information and PMID

Facets sets:
Faceted browsing and filtering



Interaction between lectin and glycan

Information about Interaction between lectin and glycan

- Scientific Name(Microorganisms)
- Pathogen Adherence Molecule(Type and Name, Gemonic Name) ・Binding
- Ligand Name ・Target Source ・Ligand Features ・Glycan Sequence ・Epitope
- JCGGDB-ID ・MOTIF-ID(on JCGGDB) ・Size of Glycan