



**HAL**  
open science

## **BioPortal: A Web Repository for Biomedical Ontologies and Data Resources**

Patricia L. Whetzel, Natasha F. Noy, Nigam H. Shah, Benjamin Dai, Michael Dorf, Nicholas B. Griffith, Clement Jonquet, Michael J. Montegut, Daniel L. Rubin, Cherie H. Youn, et al.

► **To cite this version:**

Patricia L. Whetzel, Natasha F. Noy, Nigam H. Shah, Benjamin Dai, Michael Dorf, et al.. BioPortal: A Web Repository for Biomedical Ontologies and Data Resources. Pacific Symposium on Biocomputing (PSB 2009), Poster session, Jan 2009, Waimea, HI, United States. . hal-04297888

**HAL Id: hal-04297888**

**<https://hal.science/hal-04297888>**

Submitted on 21 Nov 2023

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

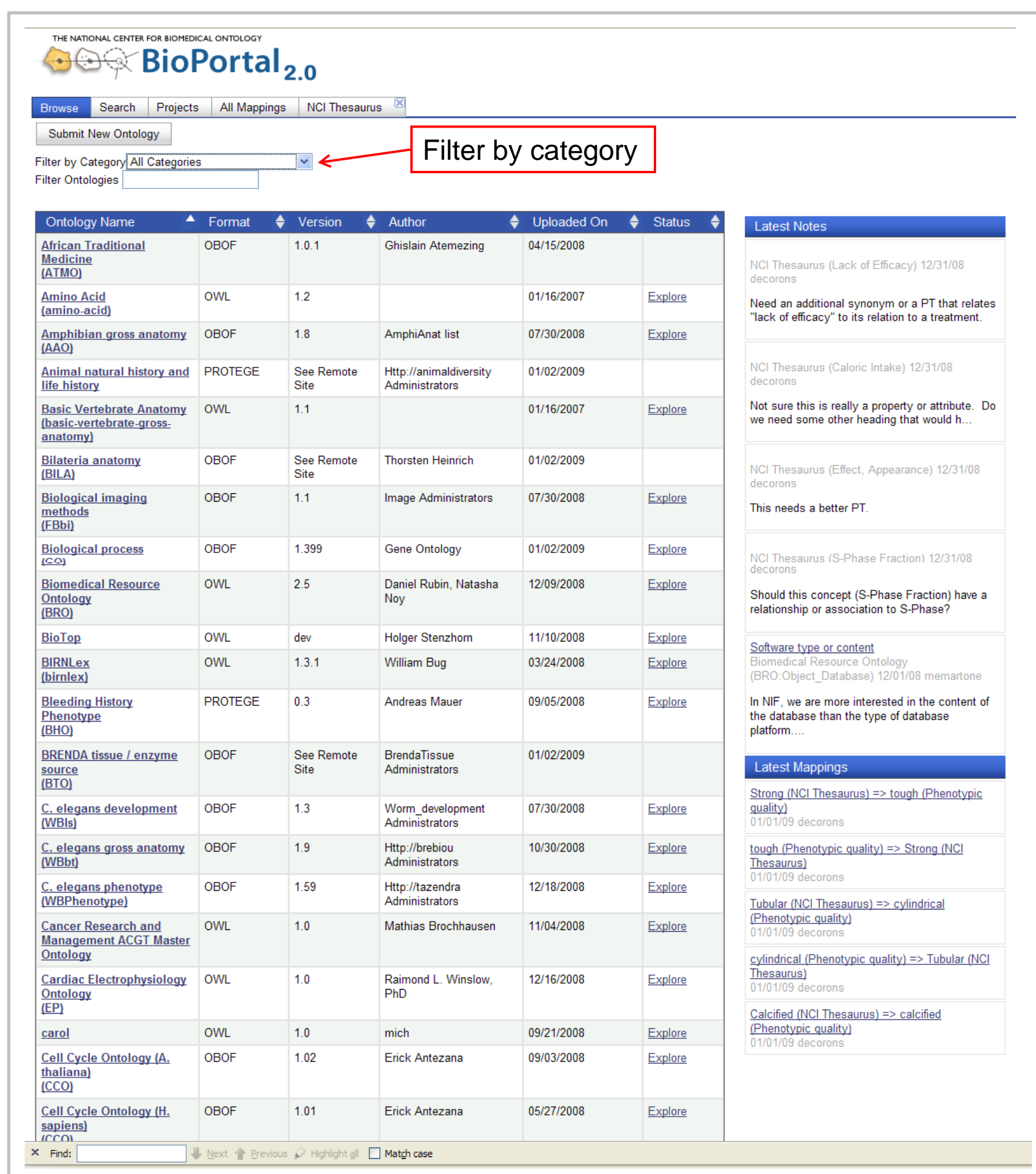
L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

## Introduction

Biomedical ontologies provide essential domain knowledge to drive data integration, information retrieval, natural-language processing, and decision support. The National Center for Biomedical Ontology, one of the seven National Centers for Biomedical Computing created under the NIH Roadmap, is developing BioPortal, a Web-based system that serves as a repository for biomedical ontologies. BioPortal defines relationships among those ontologies and between the ontologies and online data resources such as PubMed, ClinicalTrials.gov, and the Gene Expression Omnibus (GEO). BioPortal supports not only the technical requirements for access to biomedical ontologies either via Web browsers or via Web services, but also community-based participation in the evaluation and evolution of ontology content. BioPortal enables ontology users to learn what biomedical ontologies exist, what a particular ontology might be good for, and how individual ontologies relate to one another. BioPortal is available online at the following location: <http://bioportal.bioontology.org/>.

## BioPortal Ontology Library

- Total number of ontologies: 127
- Number of classes/types: 500,109
- Ontology formats: OWL, OBO format, Protégé



Ontology Name	Format	Version	Author	Uploaded On	Status	Latest Notes
African Traditional Medicine (ATBM)	OBOF	1.0.1	Ghislain Asemmez	04/15/2008	Exists	NCI Thesaurus (Lack of Efficacy) 12/31/08 decodes
Amino Acid (amino acid)	OWL	1.2		01/16/2007	Exists	Need an additional synonym or a PT that relates "lack of efficacy" to its relation to a treatment.
Amphibian gross anatomy (AAG)	OBOF	1.8	Amphibia list	07/30/2008	Exists	NCI Thesaurus (Cortic Intake) 12/31/08 decodes
Animal natural history and life history	PROTEGE	See Remote Site	Http://animaldiversity Administrators	01/02/2009	Exists	Not sure this is really a property or attribute. Do we need some other heading that would h...
Bale Cetacean Anatomy (Bale Cet)	OWL	1.1		01/16/2007	Exists	NCI Thesaurus (Erect. Appearance) 12/31/08 decodes
Biological Imaging methods (EBM)	OBOF	1.1	Image Administrators	07/30/2008	Exists	This needs a better PT
Biological process (BIO)	OBOF	1.359	Gene Ontology	01/02/2009	Exists	NCI Thesaurus (S-Phase Fraction) 12/31/08 decodes
Biological Resource Ontology (BRO)	OWL	2.5	Daniel Rubin, Natasha Noy	12/09/2008	Exists	Should the concept (S-Phase Fraction) have a relationship or association to S-Phase?
BioTop	OWL	dev	Holger Stenchoff	11/10/2008	Exists	Software type or content
BIRN Lex (BIRN Lex)	OWL	1.3.1	William Bug	03/24/2008	Exists	Biomedical Resource Ontology (BRO Object_Database) 12/31/08 mentions
Bleeding History (BHR)	PROTEGE	0.3	Andreas Maier	09/05/2008	Exists	In NIF, we are more interested in the content of the database than the type of database platform...
BRE/IDA tissue / enzyme source (BET)	OBOF	See Remote Site	BrendaTissue Administrators	01/02/2009	Exists	Latest Mappings
C. elegans development (CWD)	OBOF	1.3	Worm_Development Administrators	07/30/2008	Exists	Strong (NCI Thesaurus) => tough (Phenotypic quality) (01/01/09) decodes
C. elegans gross anatomy (CWA)	OBOF	1.9	Http://biodid Administrators	10/30/2008	Exists	tough (Phenotypic quality) => Strong (NCI Thesaurus) (01/01/09) decodes
C. elegans phenotype (CWP)	OBOF	1.59	Http://razendra Administrators	12/18/2008	Exists	Posterior Tibial Artery => cylindrical (Phenotypic quality) (01/01/09) decodes
Cancer Research and Management (CCM) Master Ontology	OWL	1.0	Mathias Brochhausen	11/04/2008	Exists	cylindrical (Phenotypic quality) => Tubular (NCI Thesaurus) (01/01/09) decodes
Cardiac Electrophysiology Ontology (EPO)	OWL	1.0	Raymond L. Winslow, PhD	12/16/2008	Exists	Retinal Artery => spiral Artery of the Endometrium (01/01/09) decodes
carol	OWL	1.0	mich	09/21/2008	Exists	Calcified (NCI Thesaurus) => calcified (Phenotypic quality) (01/01/09) decodes
Cell Cycle Ontology (JA, Rational) (CCO)	OBOF	1.02	Erick Antezana	09/03/2008	Exists	
Cell Cycle Ontology (IL, Rational) (CCO)	OBOF	1.01	Erick Antezana	05/27/2008	Exists	

## Functionalities

- BioPortal users can
- Upload their own ontologies to the repository
  - Download ontologies
  - Navigate classes and properties and visualize relationships between classes
  - View and edit ontology metadata
  - Access ontology metadata and content via Web services
  - Add mappings
  - Comment on ontologies and individual terms within an ontology
  - Add Projects that use ontologies
  - Link to resources annotated with specific ontology terms

## BioPortal Web Services

Access ontology content via REST web services

- **Prefix** for REST URLs <http://rest.bioontology.org/bioportal/rest>

Examples of service calls

- List metadata for the latest version of all ontologies
- List all ontology categories
- Get latest version of an ontology by virtual ontology id
- Download a given version of an ontology
- Get all root concepts for an ontology
- Get concept id by term name
- Search for terms in 1 or more ontologies

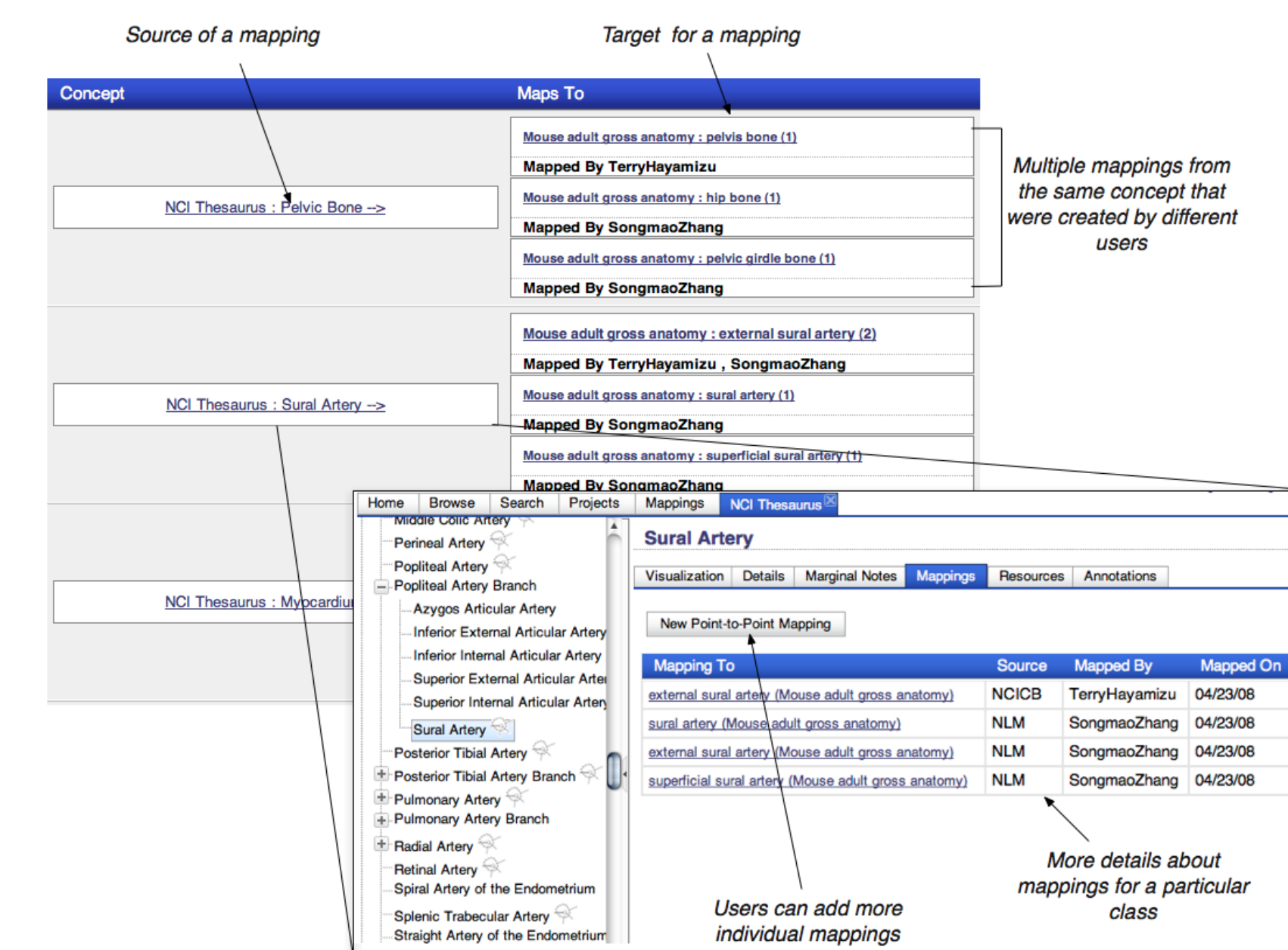
- List of Web Services:

[http://bioontology.org/wiki/index.php/NCBO\\_REST\\_services](http://bioontology.org/wiki/index.php/NCBO_REST_services)

## Ontology Mappings in BioPortal

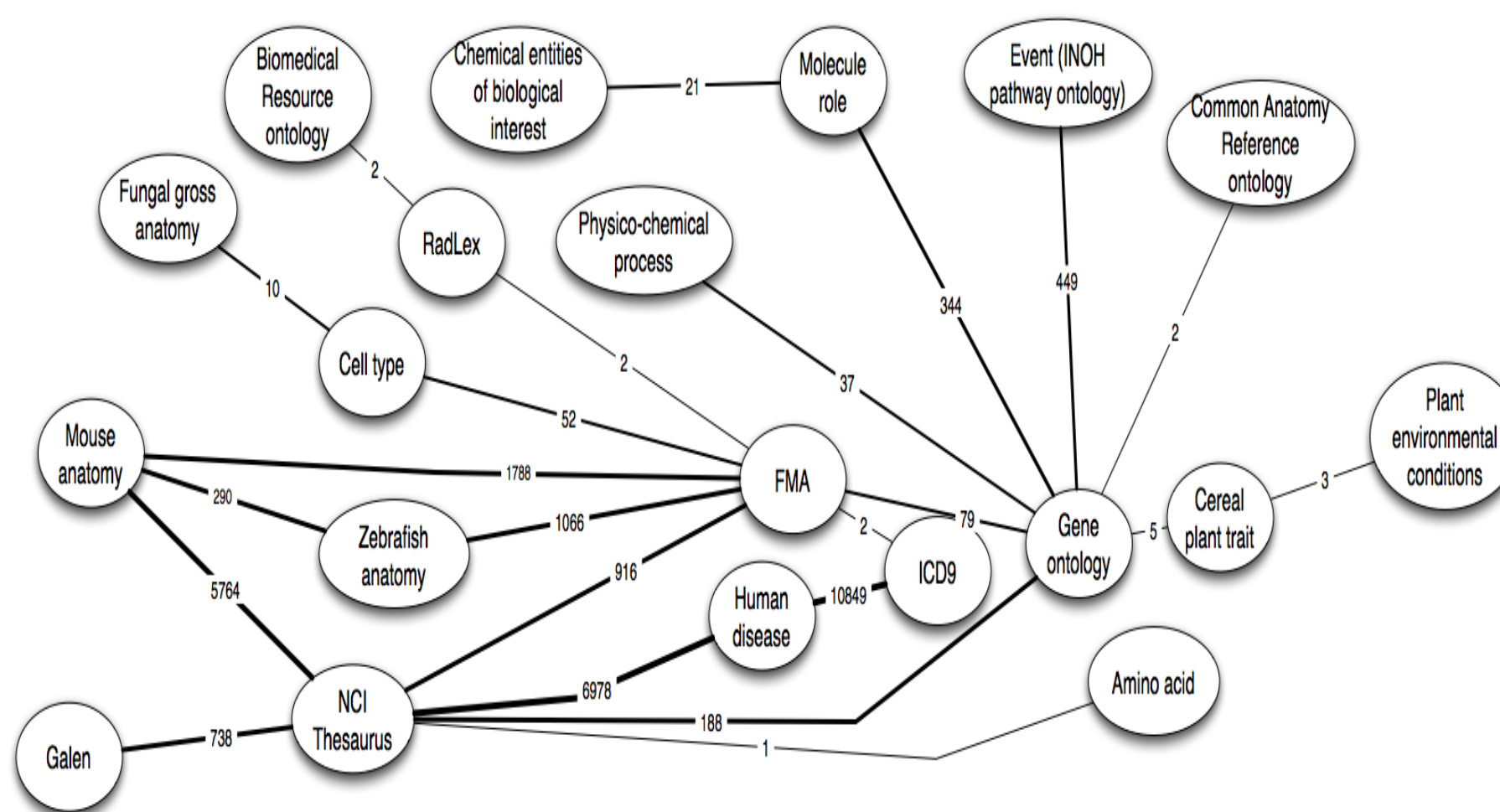
BioPortal provides a community-based repository of ontology mappings, which enables users to

- **Upload** bulk mappings in a structured format
- **Download** mappings based on a selected parameters
- **Define** point-to-point mappings interactively
- **Comment** on mappings created by others
- **Refine** and **discuss** existing mappings
- **Access** mappings through web services
- Provide **metadata** about the mappings, such as:
  - mapping relationship
  - provenance (who created the mapping and when)
  - application context
  - mapping dependency
  - algorithm used to create the mapping (configuration, parameters, etc.)
  - external references



## Current Set of Mappings in BioPortal

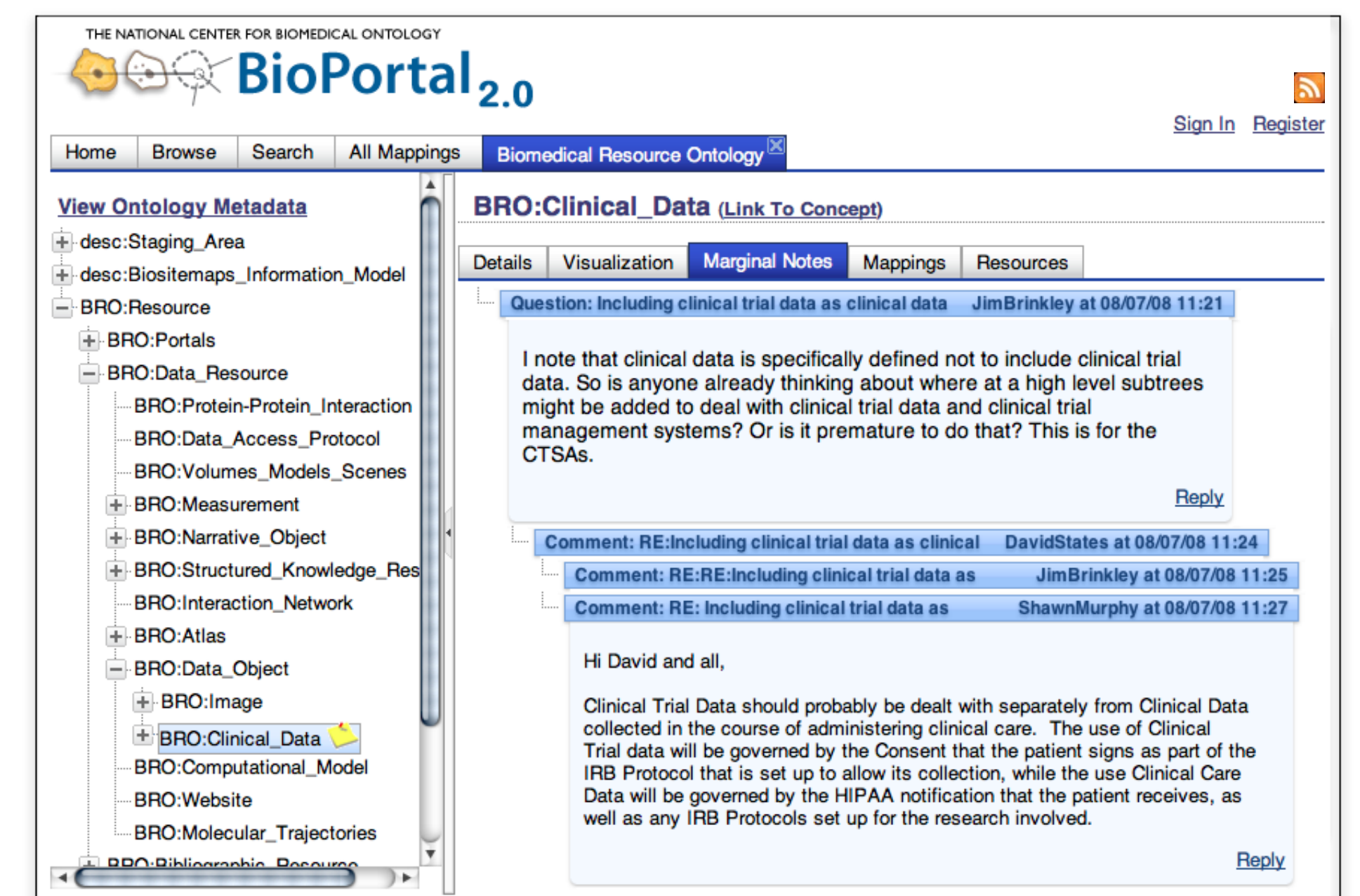
BioPortal has more than 30,000 mappings in its repository, involving 20 ontologies:



## Community Feedback

Members of biomedical research communities can use the **Notes** functionality in BioPortal to

- Provide feedback to ontology authors
- Reach consensus on ontology decisions
- Review ontology components



## Ontology Peer-Review

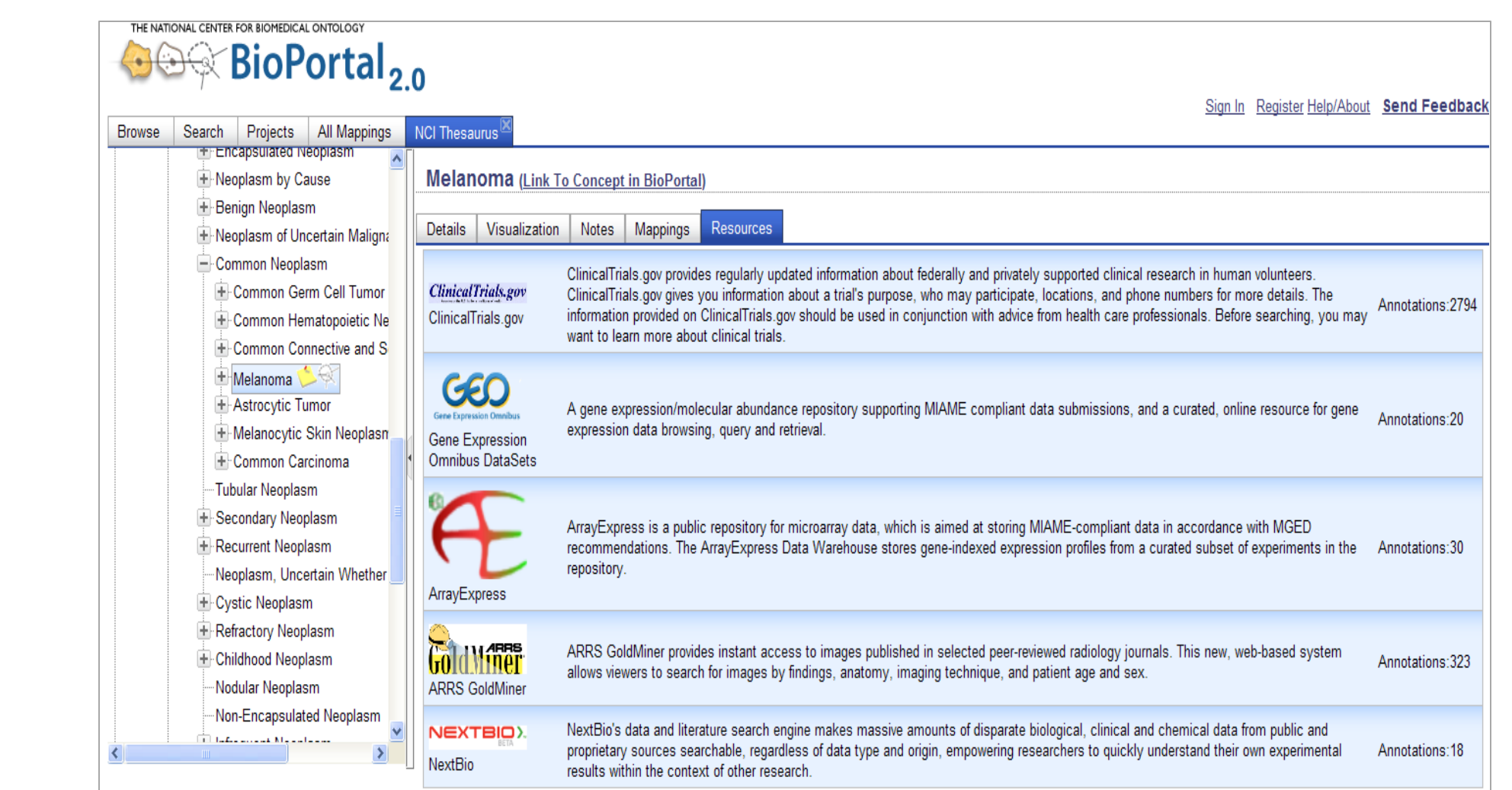
BioPortal enables ontology *users* to provide feedback on ontologies in BioPortal. Ontology reviewers can provide the following information

- General review and rating of the ontology
- Usage information
  - Which applications have successfully used the ontology?
  - What problems were encountered?
- Coverage
  - Does it cover the domain properly?
  - Are there major gaps?
  - Are some parts better developed than others?
- Concept-specific comments
  - Are there problems with specific concepts?
  - What alternative definitions should be used?
- **Web of Trust** mechanism will enable users to specify reviewers that they trust, or to create filters to see reviews from particular groups (e.g., OBO Foundry members).

## Ontology-Indexed Data Resources

Find biomedical data resources indexed by ontology terms

- Current resources: Gene Expression Omnibus (GEO), ArrayExpress, ClinicalTrials.gov, ARRS GoldMiner



## Acknowledgements

BioPortal is developed by the National Center for Biomedical Ontology (NCBO), one of seven National Centers for Biomedical Computing under the NIH Roadmap. BioPortal is developed in conjunction with partners at the University of Victoria and the Mayo Clinic. For more information on NCBO and working the Center, visit <http://bioontology.org/> or email [support@bioontology.org](mailto:support@bioontology.org).