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BioPortal: A Web Repository for Biomedical Ontologies and Data Resources

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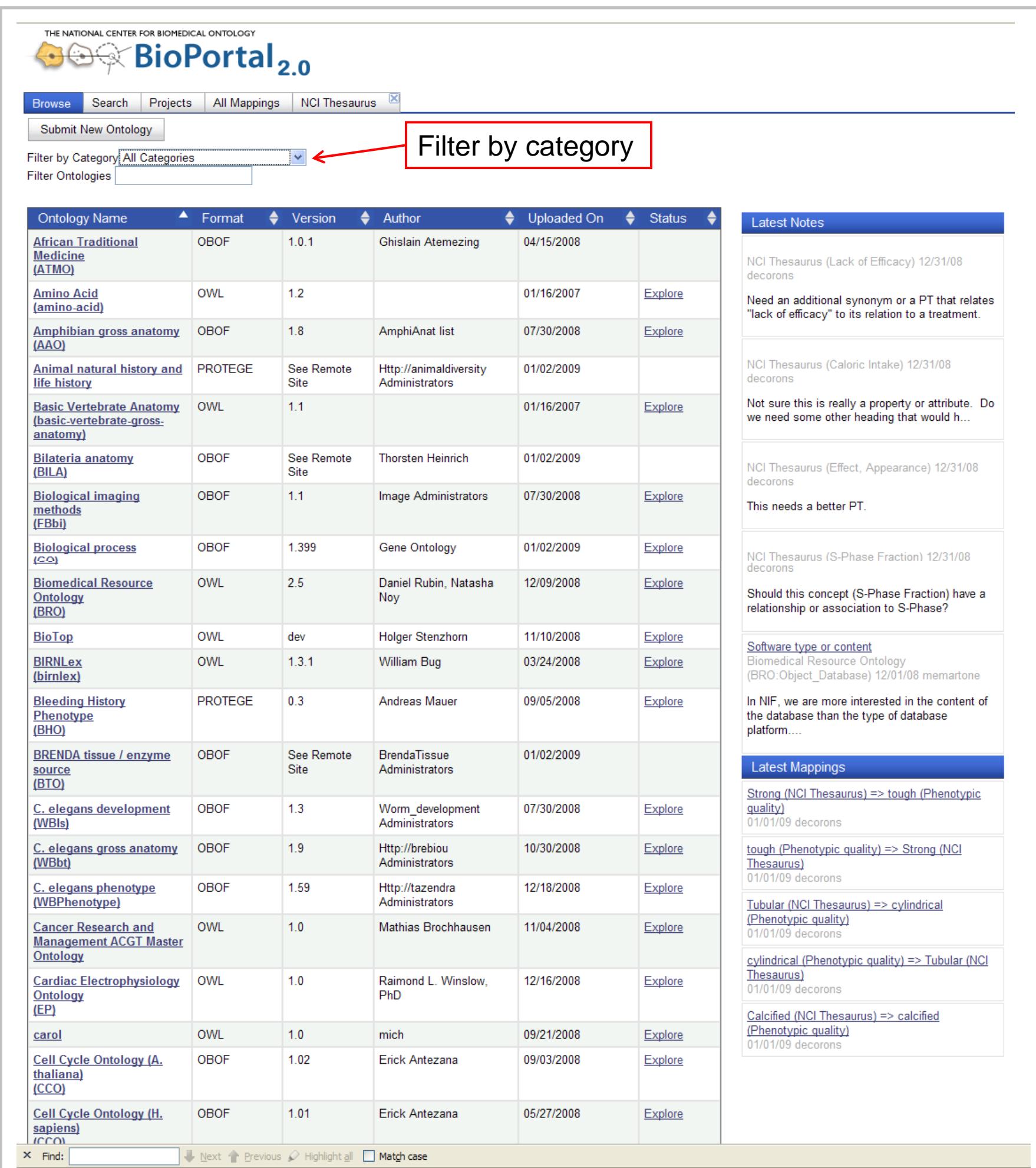
<http://bioportal.bioontology.org>

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



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>

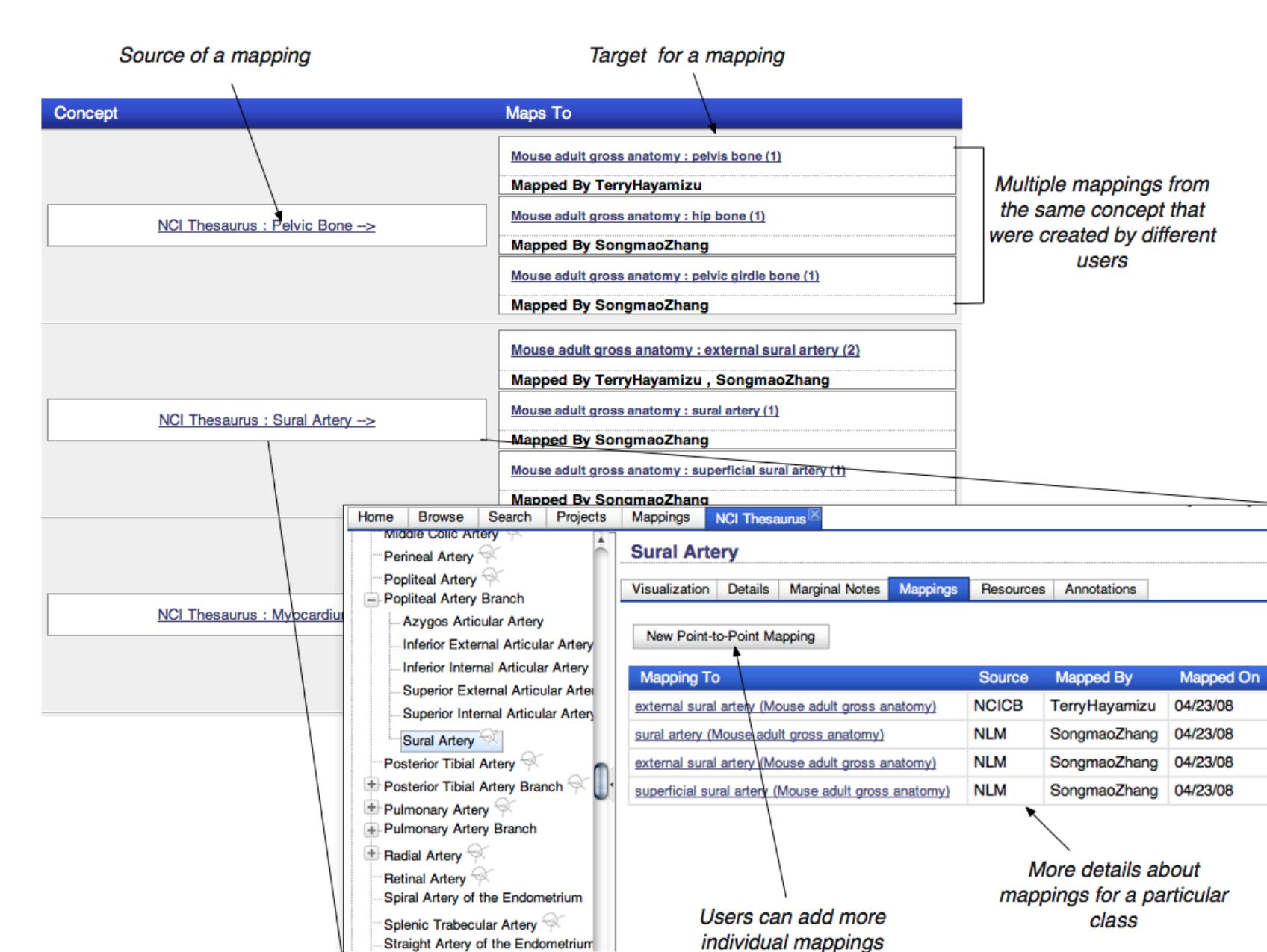
Examples of service calls

- 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

Ontology Mappings in BioPortal

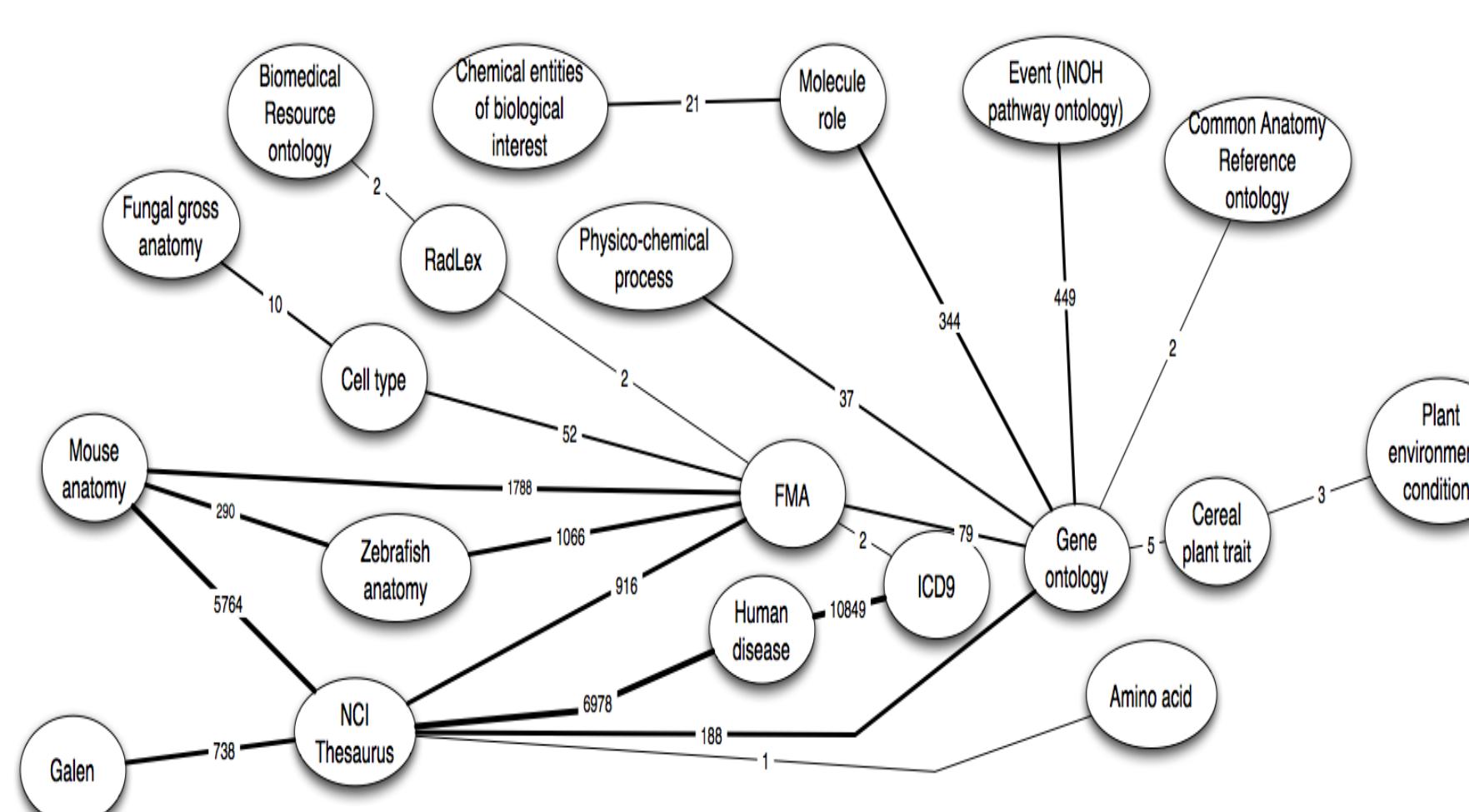
BioPortal provides a community-based repository of ontology mappings, which enables users to

- 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

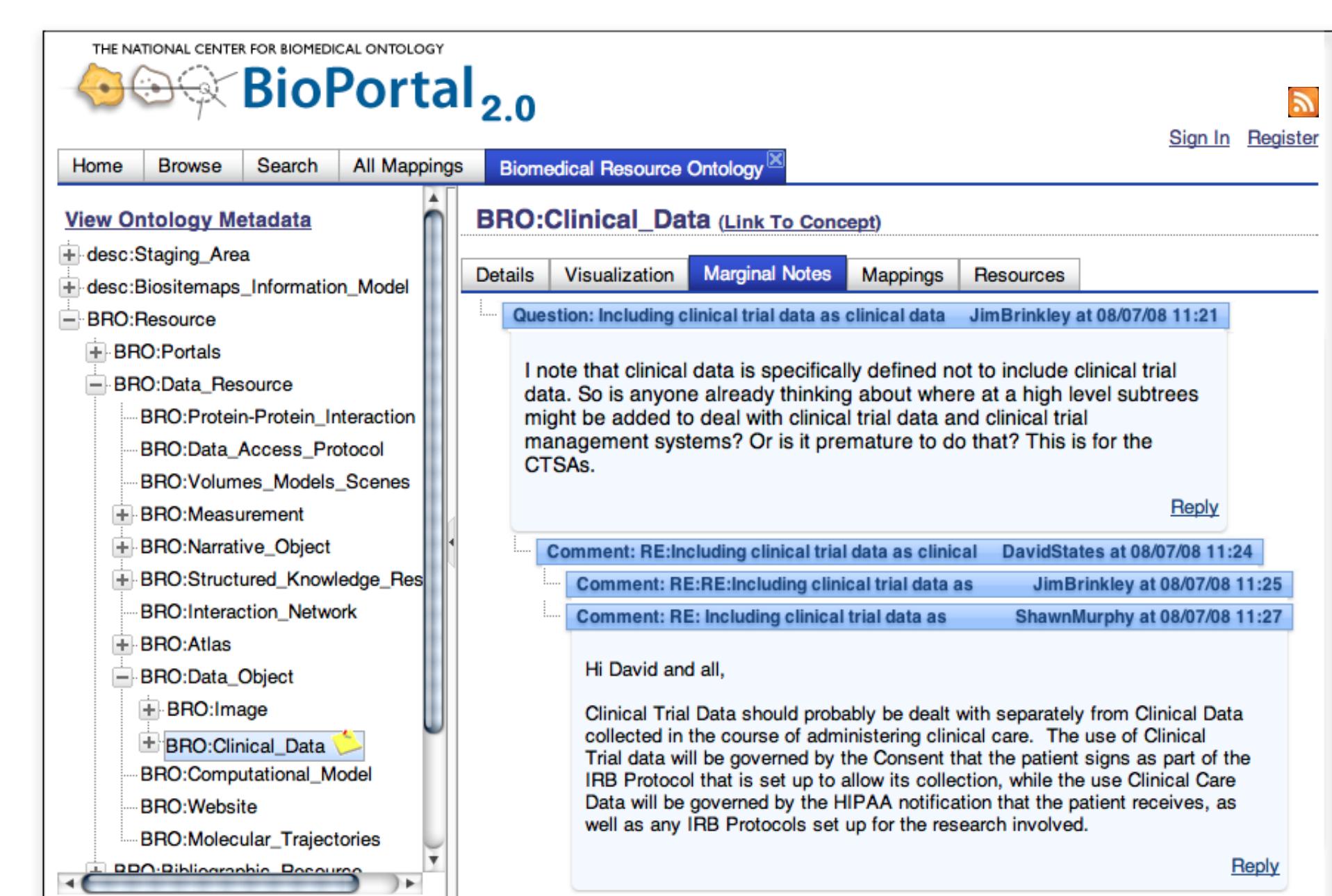
BioPortal has more than 30,000 mappings in its repository, involving 20 ontologies:



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

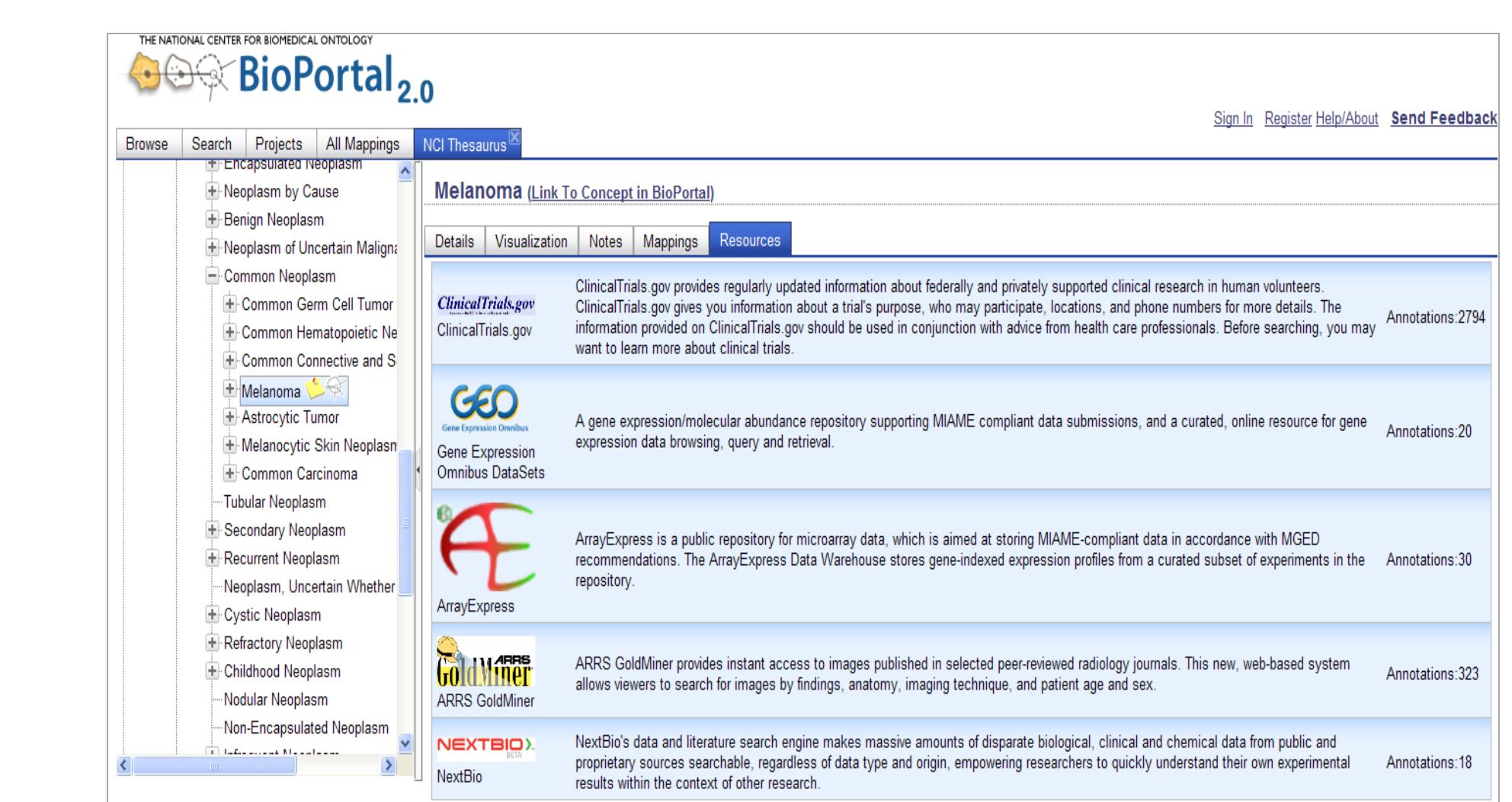
BioPortal enables ontology users to provide feedback on ontologies in BioPortal. Ontology reviewers can provide the following information

- 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.