HUPO Proteomics Standards Initiative

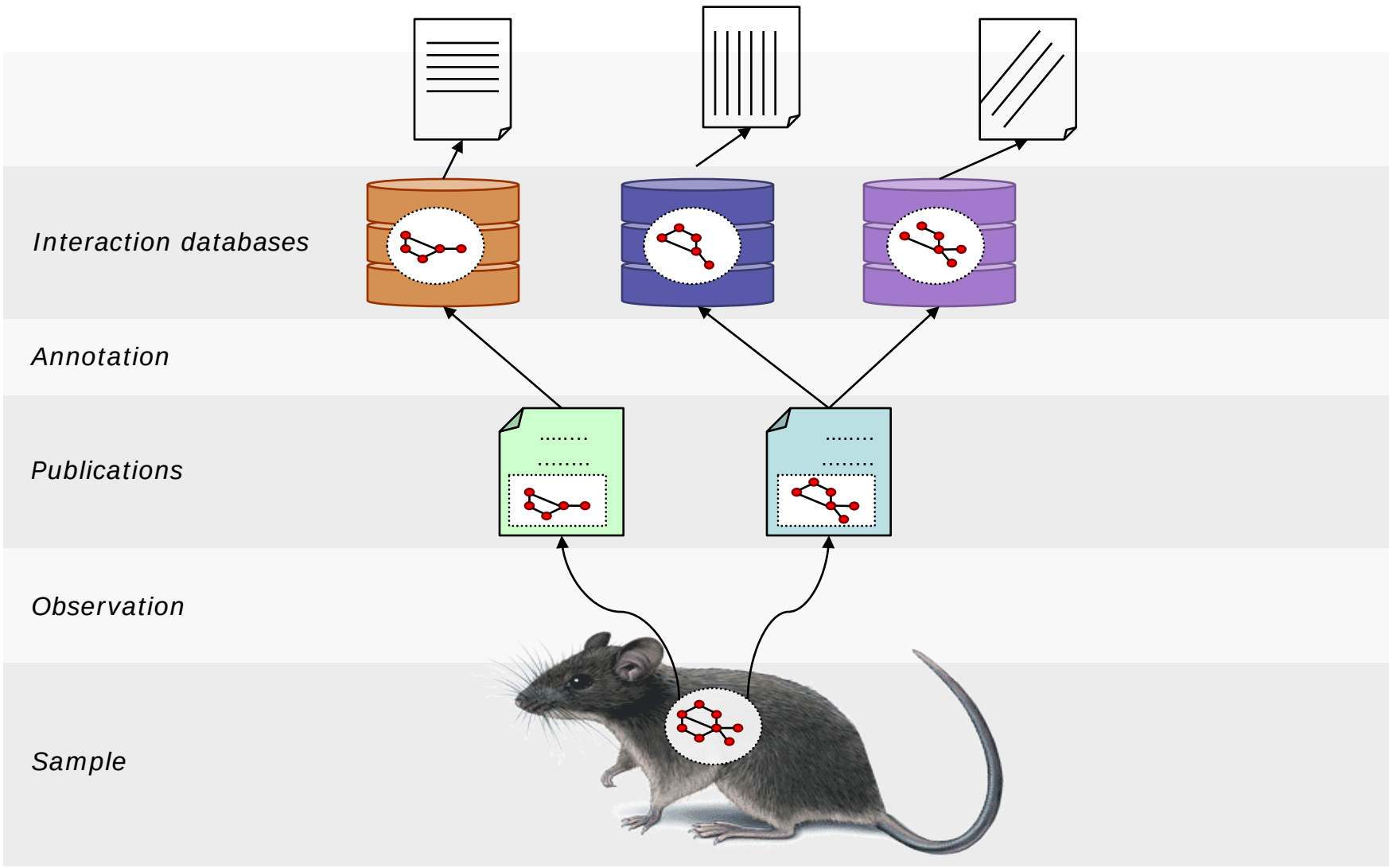
PSICQUIC, the PSI Common Query Interface

Henning Hermjakob

Edinburgh, October 2010

EMBL-EBI

PSI MI XML:
Consistent format



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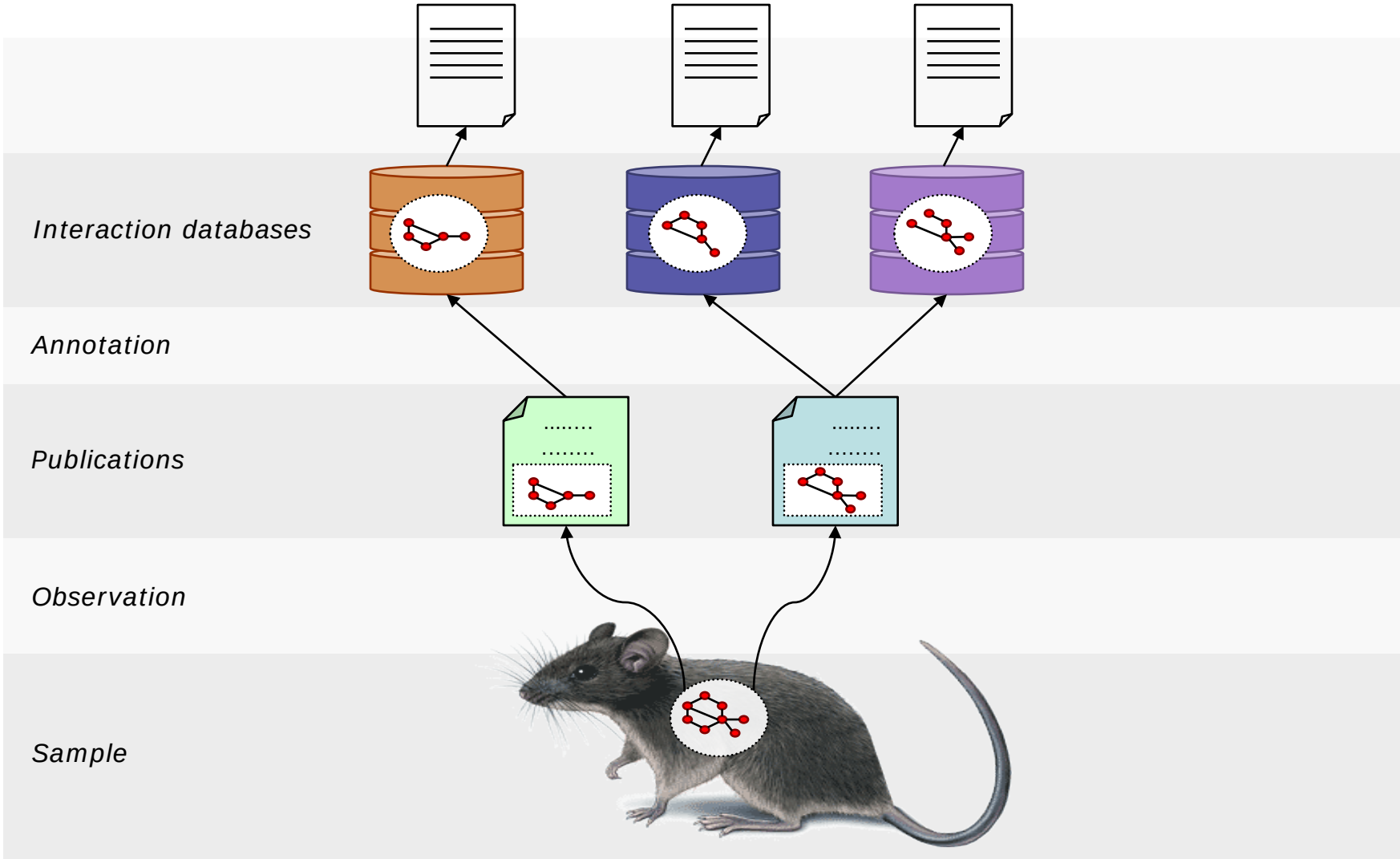
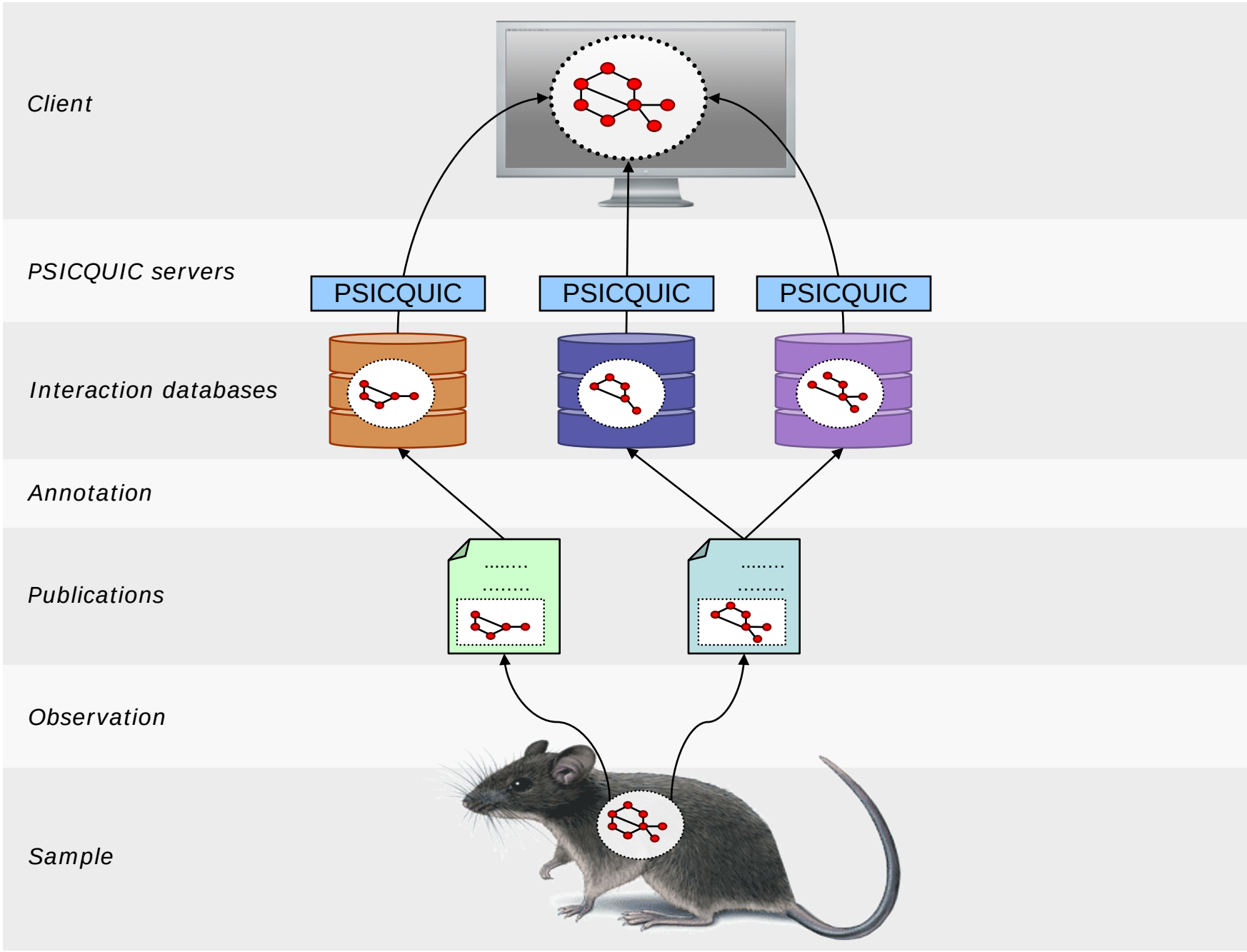
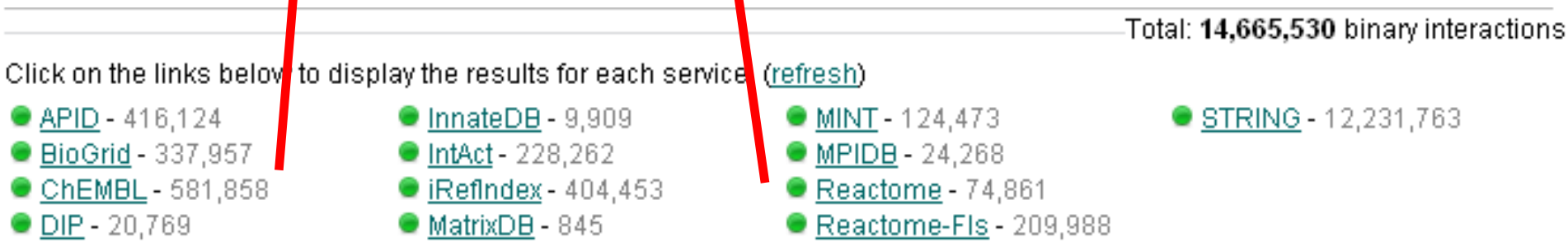
Consistent format



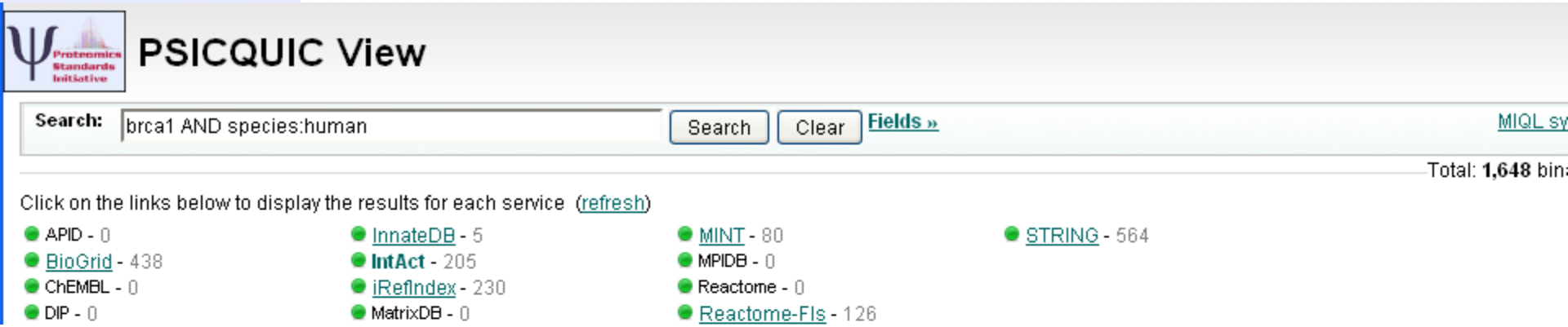

Client
PSICQUIC servers
PSICQUIC
PSICQUIC
PSICQUIC
Interaction databases
Annotation
Publications
Observation
Sample

PSICQUIC:
The PSI Common Query InterfaCe

- Common computational interface for querying molecular interaction databases
  - Simple interface, open source server implementation exists, can be “fed” from a tab-delimited file => easy to provide data
  - Not limited to protein-protein interactions, also e.g.
    - Drug-target interactions
    - Simplified pathway data



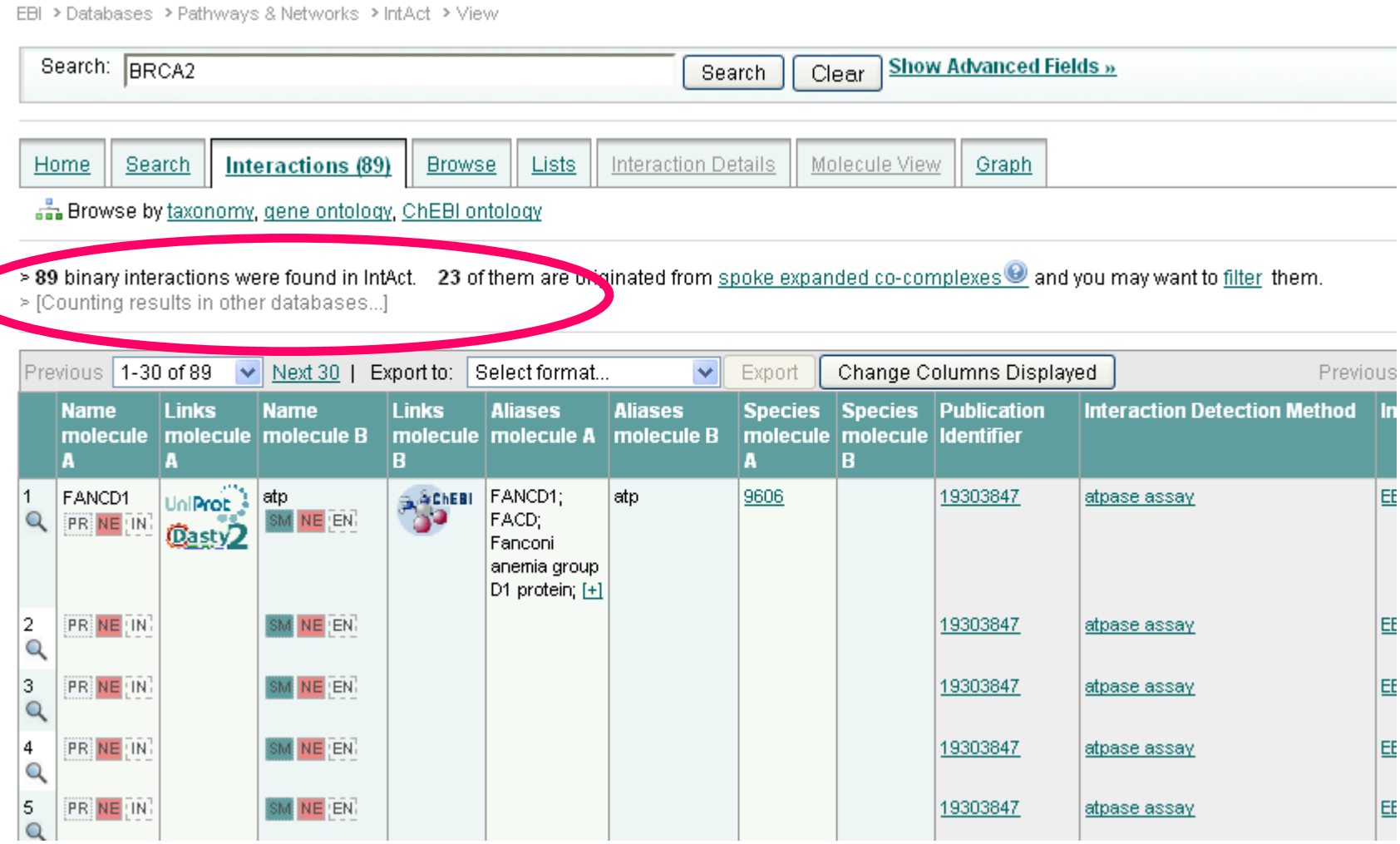
PSICQUIC:
Simple PSICQUIC viewer



http://www.ebi.ac.uk/Tools/webservices/psicquic/view

PSICQUIC:

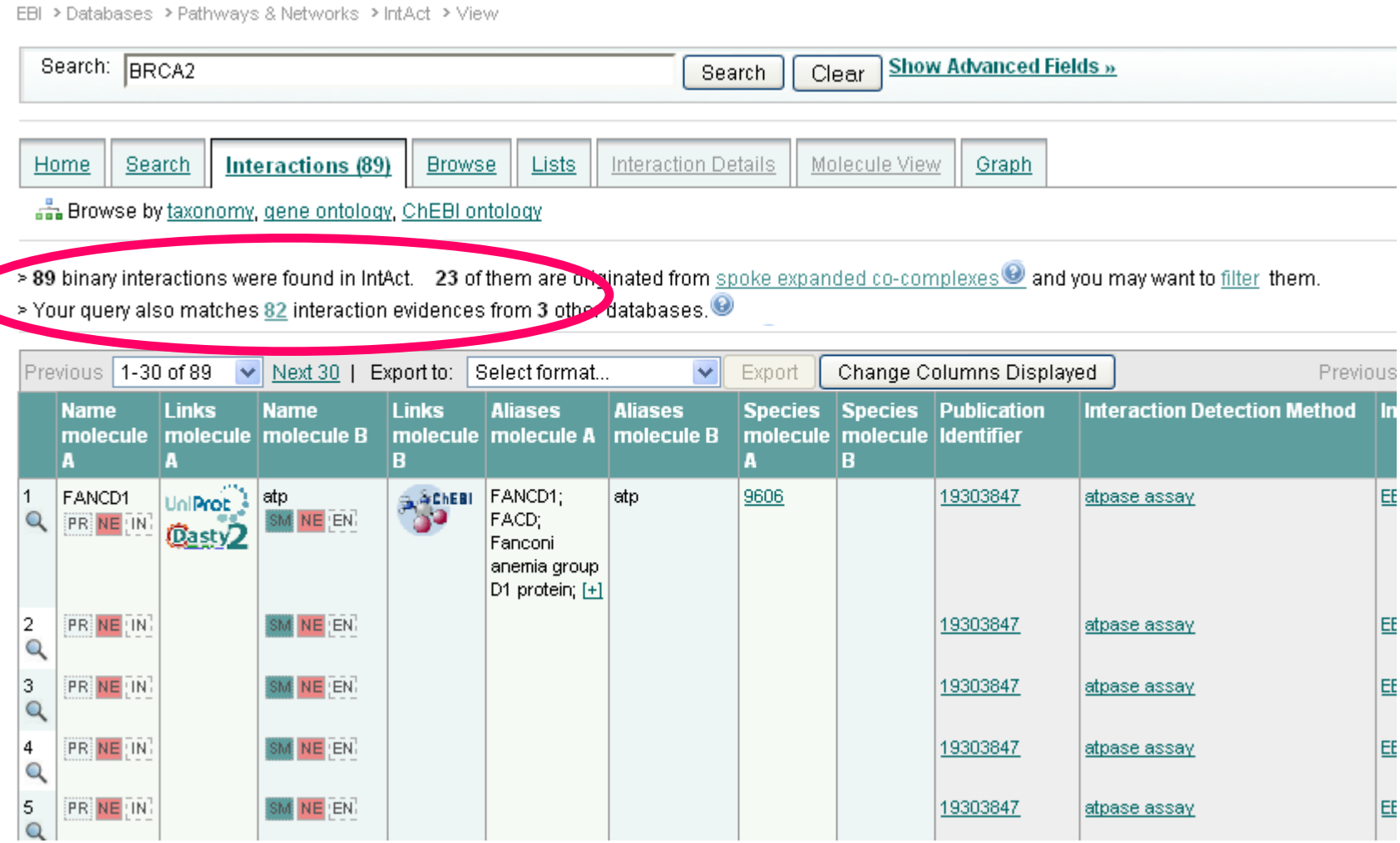
Pointing to other resources



http://www.ebi.ac.uk/intact

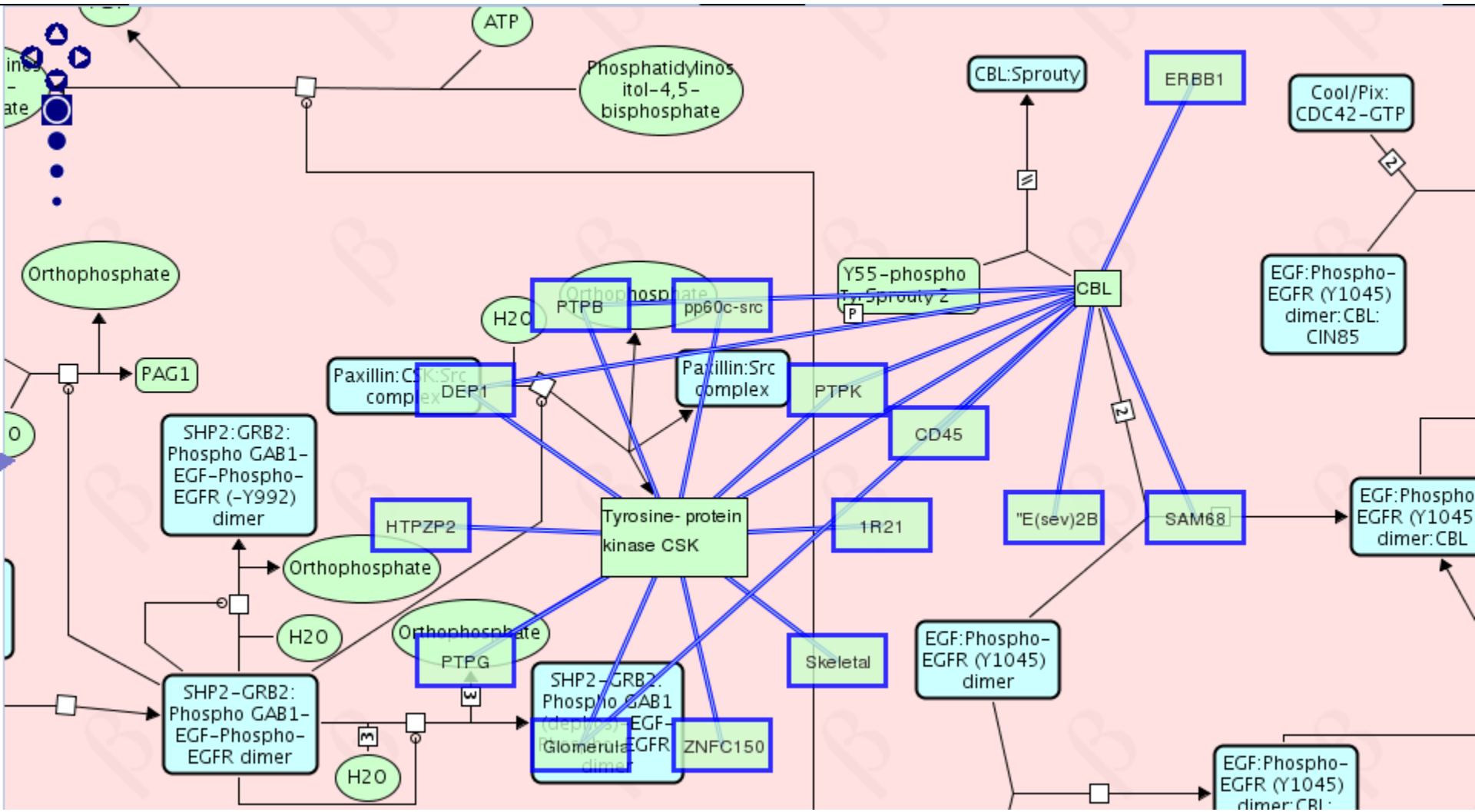
PSICQUIC:

Pointing to other resources



http://www.ebi.ac.uk/intact

PSICQUIC: Overlay of molecular interactions on Reactome pathways (beta)



PSICQUIC Query Language: MIQL

- Based on Lucene, with specific field names
- Example: ppx AND species:"Escherichia coli“
-

Field Name	Searches on	Implicit*	Example
idA	IdentifierA	No	idA:P74565
id	Identifiers (A or B)	No	id:P74565
alias	Aliases (A or B)	No	alias:(KHDRBS1 HCK)
identifiers	Identifiers and Aliases undistinctively	Yes	identifier:P74565
pubauth	Publication 1st author(s)	Yes	pubauth:scott
pubid	Publication Identifier(s) OR	Yes	pubid:(10837477 12029088)
taxidA	Tax ID interactor A: be it the tax ID or the species name	No	taxidA:mouse
taxidB	Tax ID interactor B: be it the tax ID or species name	No	taxidB:9606
species	Species. Tax ID A and Tax ID B	Yes	species:human
type	Interaction type(s)	Yes	type:"physical interaction"
detmethod	Interaction Detection method(s)	Yes	detmethod:"two hybrid*"
interaction_id	Interaction identifier(s)	Yes	interaction_id:EBI-761050
annotation	Annotations Interactor A or B	No	annotation:experimental
properties	Properties of Interactor A or B (note that this field also contains parent terms of ontology terms of GO, InterPro and PSI-MI)	Yes	properties:"1GQ5"
expansion	Expansion method(s)	Yes	expansion:spoke
dataset	Dataset name(s)	Yes	dataset:Apoptosis
experimentalRole	Experimental role(s) interactor A or interactor B	No	experimentalRole:prey
biologicalRole	Biological role(s) interactor A or interactor B	No	biologicalRole:enzyme
hostOrganism	Host organism in which the interaction was detected	Yes	hostOrganism:human

PSICQUIC:

The challenge

FROM:

Search: brca2 Search Clear Fields »

BioGrid (0) | ChEMBL (0) | DIP (0) | InnateDB (2) | **IntAct (89)** | MINT (22) | MPIDB (0) | MatrixDB (0) | Reactome (0) | Reactome-Functional-Interactions (29) | iRefIndex (31)

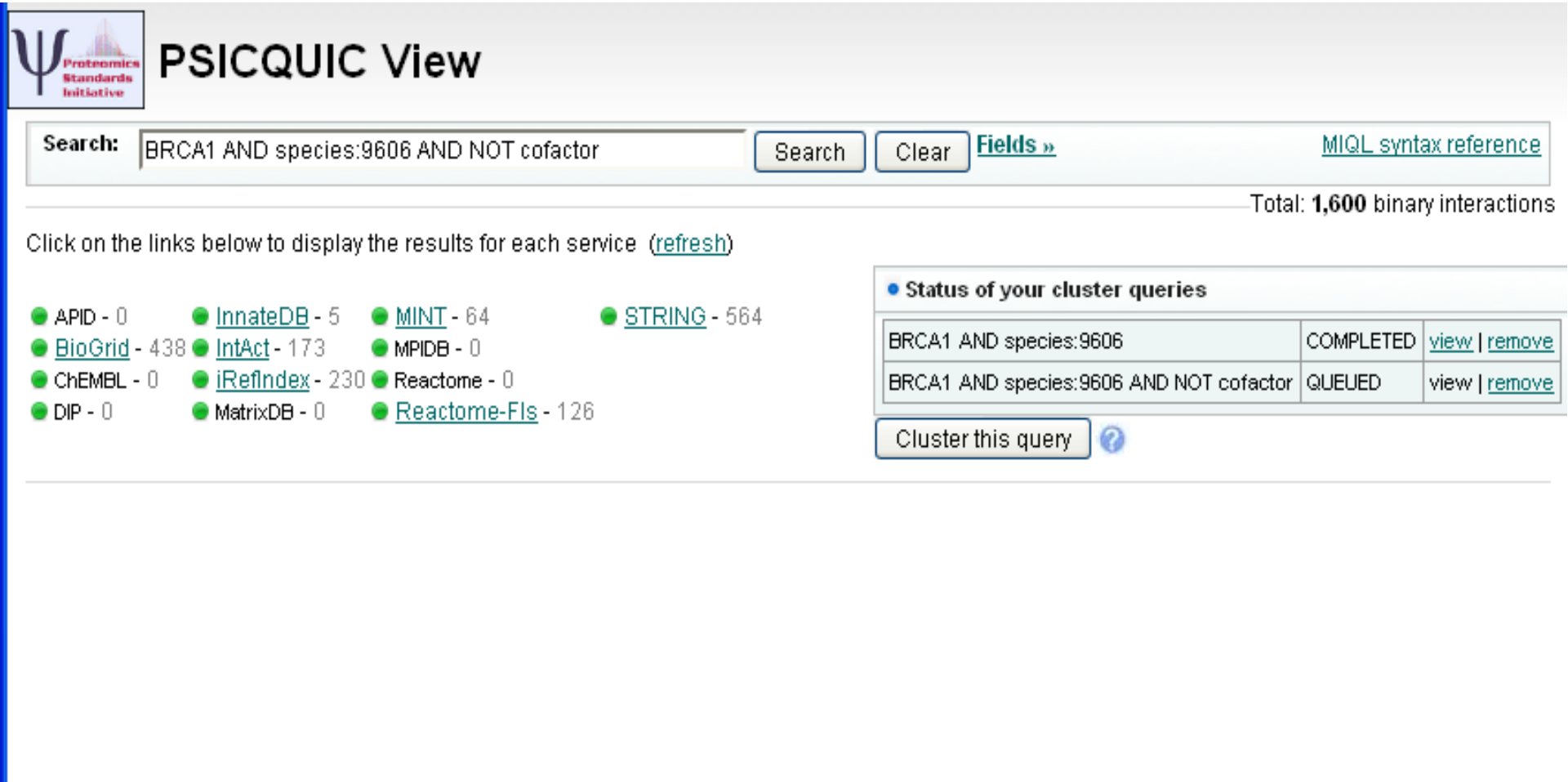
Export: MITAB 2.5 PSI-XML 2.5.4

	Name molecule A	Links molecule A	Name molecule B	Links molecule B	Alt. identifiers molecule A	Alt. identifiers molecule B	Aliases molecule A	Aliases molecule B	Species molecule A	Species molecule B	First Author	PubMed Identifier	Interaction Type	Intera Detec
1	P51587; EBI-79792	UniProt	EBI-539895		FANCD1; FACD; Fanconi anemia group D1 protein; brca2_human		BRCA2		Human (9606)	-1	Pellegrini et al. (2002)	12442171	physical association	x-ray
2	P51587; EBI-79792	UniProt	Q9BXW9-2; EBI-596878	UniProt	FANCD1; FACD; Fanconi	Q9BXW9-2	BRCA2		Human (9606)	Human (9606)	Wilson et al. (2008)	18212739	physical association	anti ba coimm

TO:

PR PY UN		PR BA UN				Marston et al. (1999)	10373512	coimmunoprecipitation	EBI-79852
At4g00020 PR BA UN	UniProt Dasty2	DMC1 PR PY UN	UniProt Dasty2	3702	3702	Siaud et al. (2004)	15014444	two hybrid	MINT EBI-307726
PR BA UN		PR PY UN				Dray et al. (2006)	16415210	two hybrid	IntAct EBI-930902
PR BA UN		PR PY UN				Siaud et al. (2004)	15014444	two hybrid	MINT EBI-930747
PR BA UN		PR PY UN				Dray et al. (2006)	16415210	anti tag coimmunoprecipitation	IntAct EBI-930779

PSICQUIC Clustering



PSICQUIC View

Search: BRCA1 AND species:9606 AND NOT cofactor | Search | Clear | Fields »

← Back to all services

Clustered query: 'BRCA1 AND species:9606 AND NOT cofactor' from BioGrid, InnateDB, IntAct. MINT. Reactome-FIs. STRING. iRefIndex

	Name molecule A	Links molecule A	Name molecule B	Links molecule B	First Author	PubMed Identifier	Interaction Detection Method
151	P46736	UniProt	P38398	UniProt	Dong et al. (2003) Wu et al.(2010)	14636569 20482850 PMID019615732 omim:00113705 omim:00300617 omim:00609433	experimental interaction detection anti tag coimmunoprecipitation predictive text mining experimental knowledge based
152	entrez gene/locuslink:672		entrez gene/locuslink:4800		Fan W (2002)	11777930	affinity chromatography technology
153	entrez gene/locuslink:15951		entrez gene/locuslink:672		Aglipay JA (2003)	14654789	imaging technique affinity chromatography technology
154	entrez gene/locuslink:672		entrez gene/locuslink:851212		Bennett CB (2008)	18197258	genetic interference
155	entrez gene/locuslink:672		entrez		Bennett CB (2008)	18197258	genetic interference

Molecular Interactions - Dataset: set3

It provides molecular interaction data from different molecular interactions databases. It makes use of PSICQUIC.

Table view | Network view

Pubmed ID selection

Database selection

☑ chembl ☐ intact ☐ mint

Experiment selection

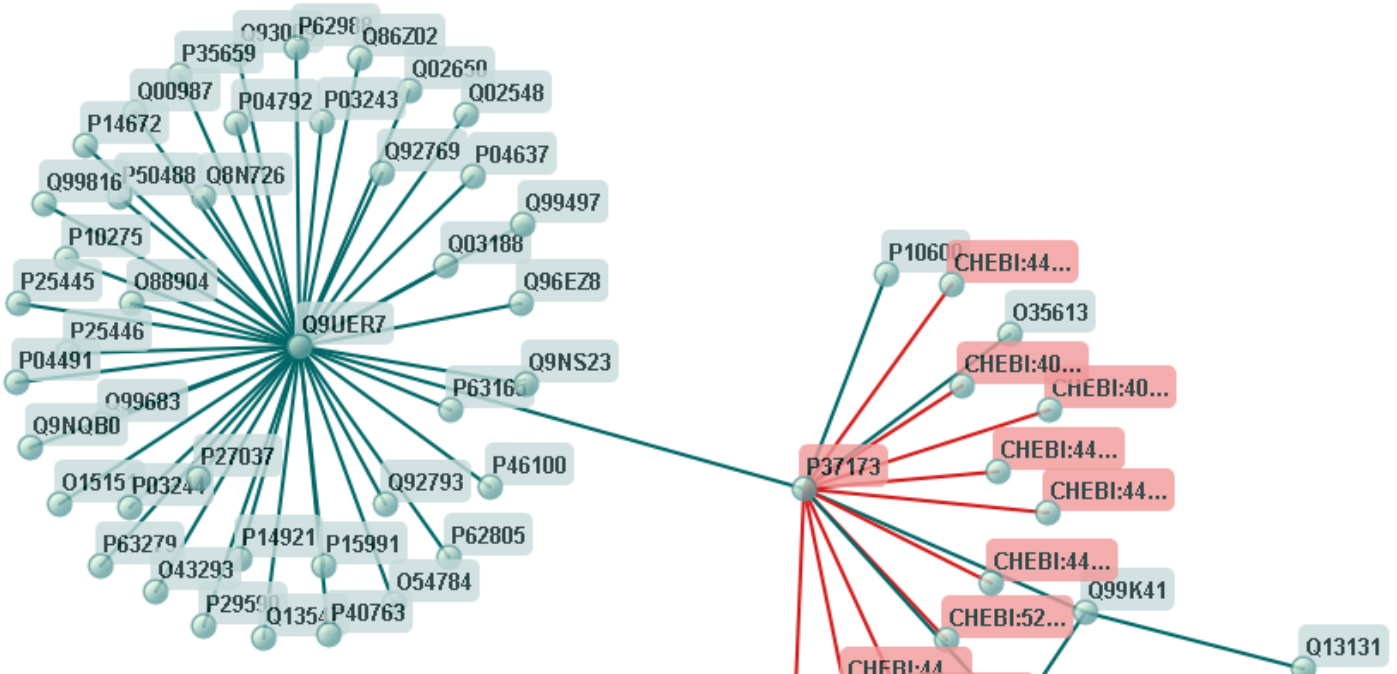
Filter by number

Associated databases	Associated pubmeds	Associated experiments
○ none	○ none	○ none
○ 1 or more	○ 1 or more	○ 1 or more
○ 2 or more	○ 2 or more	○ 2 or more
○ 3 or more	○ 3 or more	○ 3 or more
○ 4 or more	○ 4 or more	○ 4 or more

10 interactions with 20 interactors for the "chembl" database

Download ALL the interactions

Download SELECTED interactions



PSISCORE

max planck institut informatik

DASMIweb - dynamic online integration and annotation of molecular interaction data

Query

Query

e.g. Entrez Gene, GI, Pfam, RefSeq UniProtKB

Batch retrieval

Show Source Configuration

Interactor Information

Identifier: 961 (Entrez Gene) (Leukocyte surface antigen CD47 precursor (Integrin-associated protein)(IAP) (Antigenic surface determinant protein OA3) (Protein MER6).) (CD47 molecule)

UniProtKB CD47_HUMAN, A8K198_HUMAN, Q71A41_HUMAN,

UniGene Hs.446414,

Entrez Gene 961,

30 interactions (showing 11 to 20) previous next

Export as ...

Select confidence measure ...

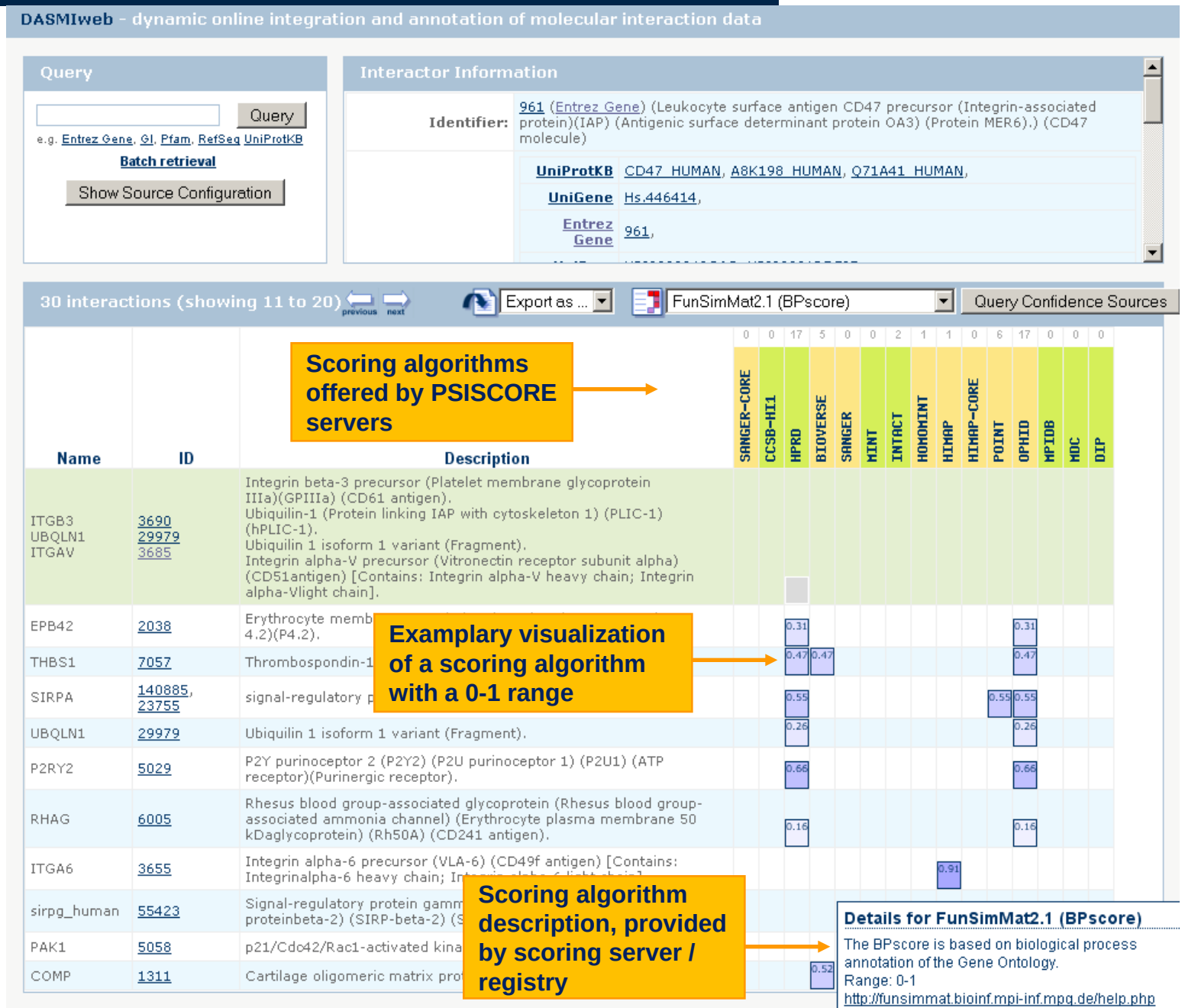
Query Confidence Sources

Select confidence measure ...
Bioverse (originalConfidenceScore)
Domain support (crystal-structure)
Domain support (predicted)
FunSimMat2.1 (BPscore)
FunSimMat2.1 (CCscore)
FunSimMat2.1 (MFscore)
HiMAP (originalConfidenceScore)

Scoring algorithms offered by PSISCORE servers

Name	ID	Description	HIMAP-CORE (0)	POINT (6)	OPHID (17)	MPIDB (0)	MDC (0)	DIP (0)
ITGB3 UBQLN1 ITGAV	3690 29979 3685	Integrin beta-3 precursor (Platelet membrane glycoprotein IIIa)(GPIIIa) (CD61 antigen). Ubiquilin-1 (Protein linking IAP with cytoskeleton 1) (PLIC-1) (hPLIC-1). Ubiquilin 1 isoform 1 variant (Fragment). Integrin alpha-V precursor (Vitronectin receptor subunit alpha) (CD51antigen) [Contains: Integrin alpha-V heavy chain; Integrin alpha-Vlight chain].						
EPB42	2038	Erythrocyte membrane protein band 4.2 (Erythrocyte protein 4.2)(P4.2).						
THBS1	7057	Thrombospondin-1p180 (Fragment).						
SIRPA	140885, 23755	signal-regulatory protein alpha						
UBQLN1	29979	Ubiquilin 1 isoform 1 variant (Fragment).						
P2RY2	5029	P2Y purinoceptor 2 (P2Y2) (P2U purinoceptor 1) (P2U1) (ATP receptor)(Purinergic receptor).						
RHAG	6005	Rhesus blood group-associated glycoprotein (Rhesus blood group-associated ammonia channel) (Erythrocyte plasma membrane 50 kDaglycoprotein) (Rh50A) (CD241 antigen).						
ITGA6	3655	Integrin alpha-6 precursor (VLA-6) (CD49f antigen) [Contains: Integrinalpha-6 heavy chain; Integrin alpha-6 light chain].						
sirpg_human	55423	Signal-regulatory protein gamma precursor (Signal-regulatory proteinbeta-2) (SIRP-beta-2) (SIRP-b2) (CD172g antigen).						
PAK1	5058	p21/Cdc42/Rac1-activated kinase 1 (STE20 homolog, yeast)						
COMP	1311	Cartilage oligomeric matrix protein variant (Fragment).						

PSISCORE


DASMIweb - dynamic online integration and annotation of molecular interaction data
Query
Query
e.g. Entrez Gene, GI, Pfam, RefSeq UniProtKB
Batch retrieval
Show Source Configuration
Interactor Information
Identifier:
961 (Entrez Gene) (Leukocyte surface antigen CD47 precursor (Integrin-associated protein)(IAP) (Antigenic surface determinant protein OA3) (Protein MER6).) (CD47 molecule)
UniProtKB CD47_HUMAN, A8K198_HUMAN, Q71A41_HUMAN,
UniGene Hs.446414,
Entrez Gene 961,
30 interactions (showing 11 to 20)
previous
next
Export as ...
FunSimMat2.1 (BPscore)
Query Confidence Sources
Scoring algorithms offered by PSISCORE servers
SANGER-CORE
CCSB-HI1
HPRD
BIOVERSE
SANGER
MINT
INTACT
HOMOMINT
HIMAP
HIMAP-CORE
POINT
OPHID
MPIDB
MDC
DIP
Name
ID
Description
ITGB3 UBQLN1 ITGAV
3690 29979 3685
Integrin beta-3 precursor (Platelet membrane glycoprotein IIIa)(GPIIIa) (CD61 antigen). Ubiquilin-1 (Protein linking IAP with cytoskeleton 1) (PLIC-1) (hPLIC-1). Ubiquilin 1 isoform 1 variant (Fragment). Integrin alpha-V precursor (Vitronectin receptor subunit alpha) (CD51antigen) [Contains: Integrin alpha-V heavy chain; Integrin alpha-Vlight chain].
EPB42
2038
Erythrocyte memb 4.2)(P4.2).
THBS1
7057
Thrombospondin-1
SIRPA
140885, 23755
signal-regulatory p
UBQLN1
29979
Ubiquilin 1 isoform 1 variant (Fragment).
P2RY2
5029
P2Y purinoceptor 2 (P2Y2) (P2U purinoceptor 1) (P2U1) (ATP receptor)(Purinergic receptor).
RHAG
6005
Rhesus blood group-associated glycoprotein (Rhesus blood group-associated ammonia channel) (Erythrocyte plasma membrane 50 kDaglycoprotein) (Rh50A) (CD241 antigen).
ITGA6
3655
Integrin alpha-6 precursor (VLA-6) (CD49f antigen) [Contains: Integrinalpha-6 heavy chain; In
sirpg_human
55423
Signal-regulatory protein gamm proteinbeta-2) (SIRP-beta-2) (S
PAK1
5058
p21/Cdc42/Rac1-activated kina
COMP
1311
Cartilage oligomeric matrix pro
Examplary visualization of a scoring algorithm with a 0-1 range
Scoring algorithm description, provided by scoring server / registry
Details for FunSimMat2.1 (BPscore)
The BPscore is based on biological process annotation of the Gene Ontology.
Range: 0-1
http://funsimmat.bioinf.mpi-inf.mpg.de/help.php

Acknowledgements

- **PSICQUIC**
  - Samuel Kerrien
  - Bruno Aranda
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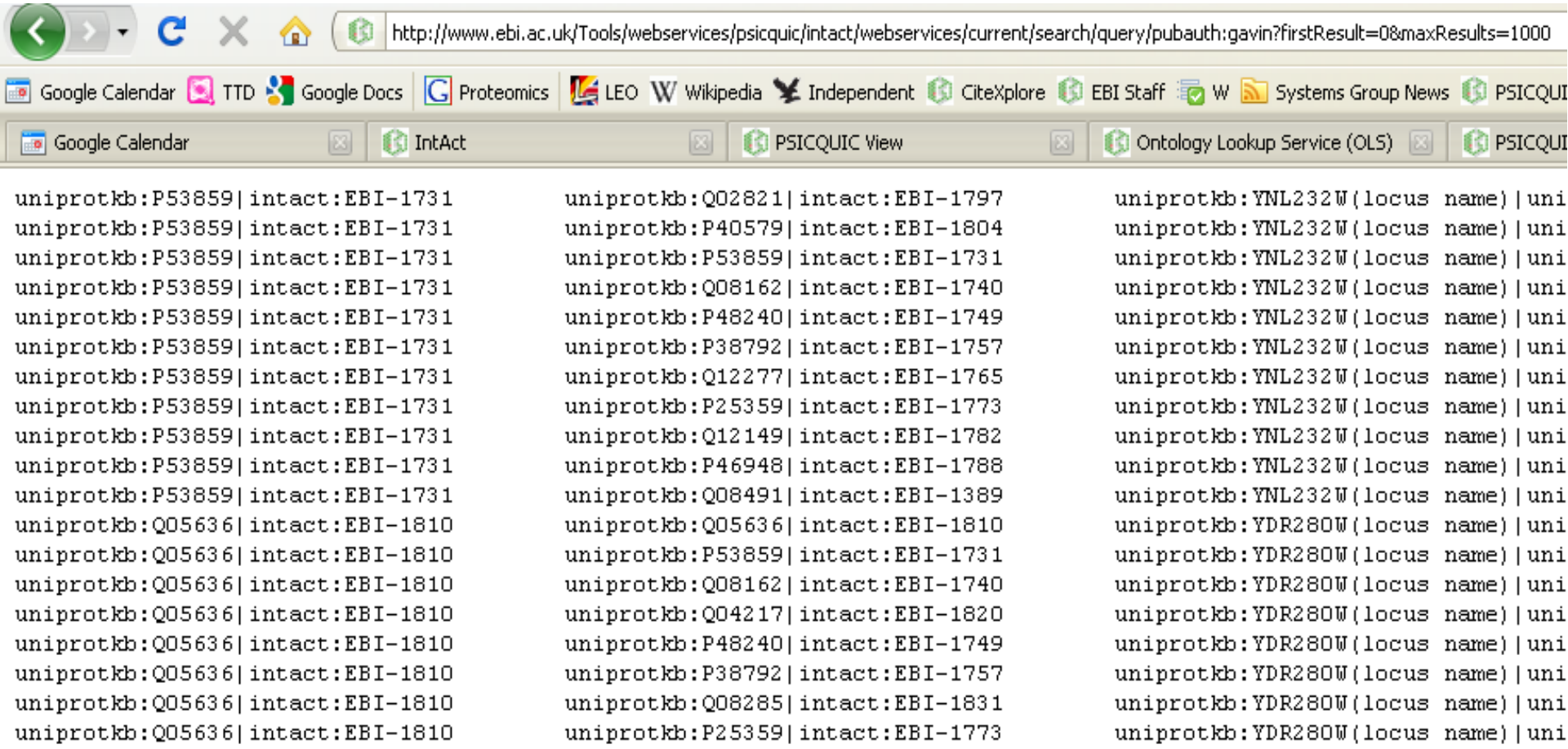
  - EU FW6 Enfin
  - EU FW7 PSIMEx

- **All participants** of the HUPO Proteomics Standards Initiative, IMEx, and ProteomeXchange

- **All authors** who make their interaction data publicly accessible, preferably through deposition to **http://www.imexconsortium.org**

PSICQUIC:
SOAP and REST interfaces



http://code.google.com/p/psicquic/