

InterMine

A Data Integration and
Analysis platform for
Biological Data

What is InterMine?

- Data Warehouse
- Open Source
- Biological Data
- University of Cambridge

What is InterMine?

- Webapp
 - Data browsing and exploration
 - Analysis tools
 - Advanced search interfaces
- API
 - Perl, Python.....JSON, XML

Who uses InterMine?

EXISTING MINES

A number of different data warehouses powered by InterMine already exist. These include:

[FlyMine](#) - *Drosophila* genomics

[modMine](#) - fly and worm modENCODE data

[MouseMine](#) - at MGI

[RatMine](#) - at RGD

[WormMine](#) - at WormBase

[YeastMine](#) - at SGD

[ZebrafishMine](#) - at ZFIN

[INDIGOmine](#) - microbes

[toxomine](#) - *Toxoplasma gondii*

[ThaleMine](#) - Araport Project with data for *Arabidopsis thaliana*

[TargetMine](#) - drug target discovery

[MitoMiner](#) - proteomic data for mitochondria

[HumanMine](#) - human

[FlyTF.org](#) - *Drosophila* transcription factors

[PhytoMine](#) - plants

[MedicMine](#) - *Medicago truncatula*

[BovineMine](#) - *Bos Taurus*

[HymenopteraMine](#) - Bees, Ants & Wasps

[SoyMine](#) - Soybase soy bean data

[BeanMine](#) - LegFed chado bean data

[LegumeMine](#) - String bean, Soy, and Peanut

[PeanutMine](#) - Peanut chado/GFF data

[Shaare](#) - Gene candidate prioritisation

[PlanMine](#) - Planarian flatworms

[Wheat3BMine](#) - Wheat chromosome 3B

[GrapeMine](#) - Grapevine

[RepetDB](#) - repetitive DNA elements

[XenMine](#) - Xenopus

Data

GENES

INTERACTIONS

ALLELES

PROTEINS

FUNCTION

SEQUENCE VARIANTS

PROTEIN DOMAINS

EXPRESSION

GENE ONTOLOGY

PHENOTYPES

DISEASE

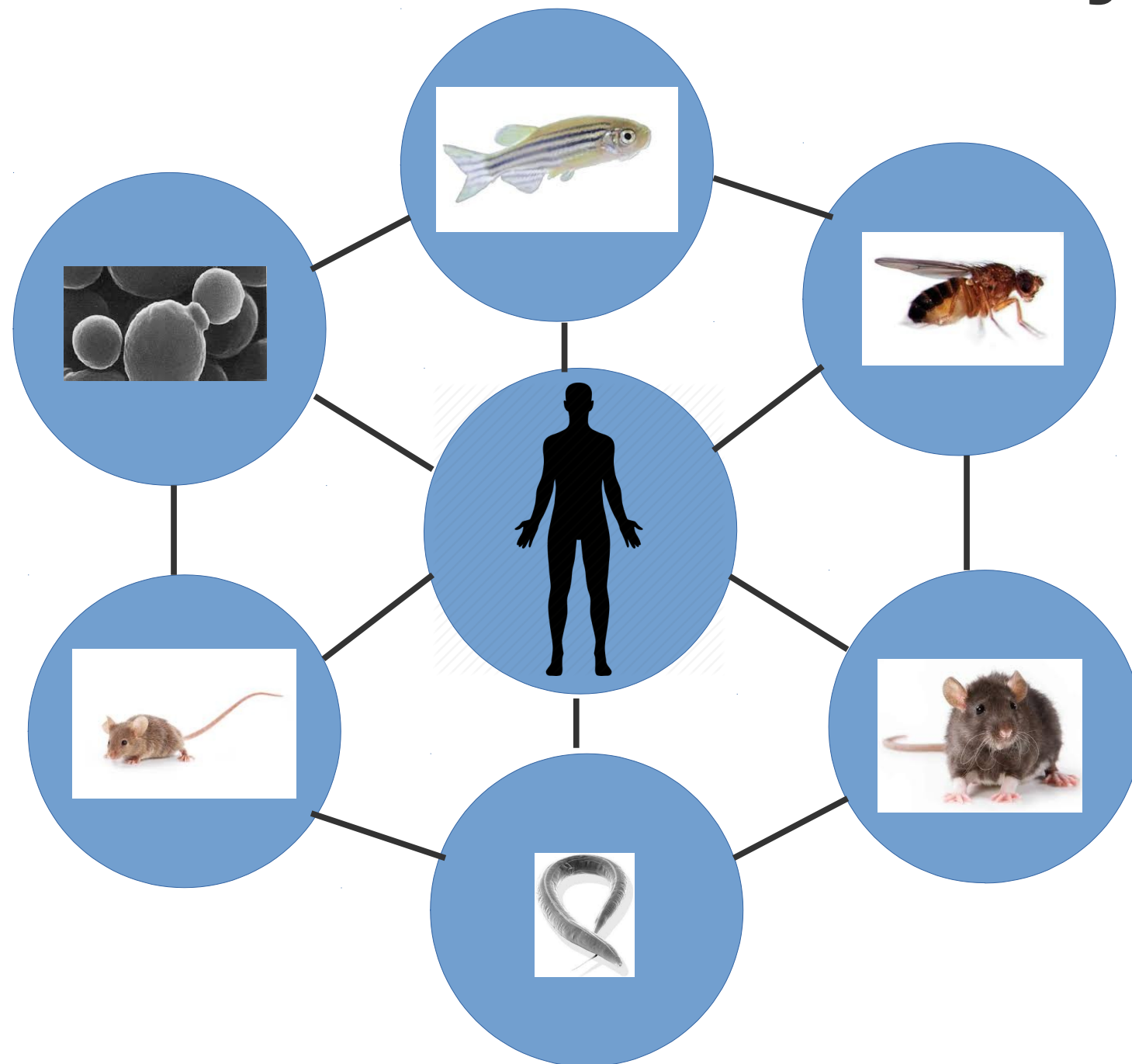
PATHWAYS

ORTHOLOGUES

GWAS

REGULATION

The InterMOD Project



 HumanMine

 FlyMine

 ZebrafishMine

 WormMine

 SGD YeastMine

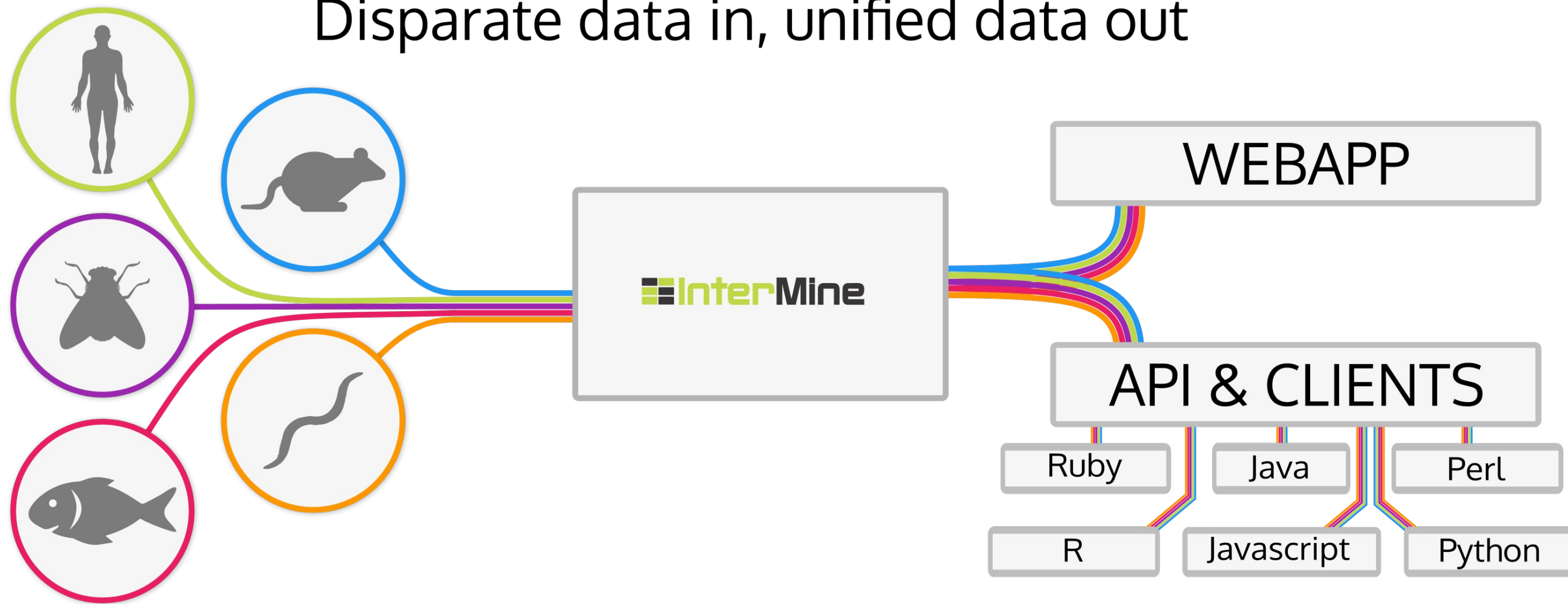
 MouseMine

 InterMine

 RGD

The InterMOD Project

Disparate data in, unified data out



Model organism images Designed by Freepik and distributed by Flaticon

The Future – InterMine in the Cloud

- Planning for an InterMine in the cloud
- Upload data file and deploy an InterMine for your data
- Interoperation
- Federated search tools

FAIR

- Makes data available (and useful) to public
- FAIR data principles*
 - Findable
 - Identifiers
 - Searchable
 - Accessible
 - Public API
 - Perl, Python.., JSON / XML ..
 - Interoperable
 - Ontologies
 - Re-usable
 - Provenance

*Wilkinson, M. D. et al. The FAIR Guiding Principles for scientific data management and stewardship. Sci. Data3:160018 doi: 10.1038/sdata.2016.18 (2016).



Applying for funding to:

generate and register unique and stable URIs

use external URIs extensively

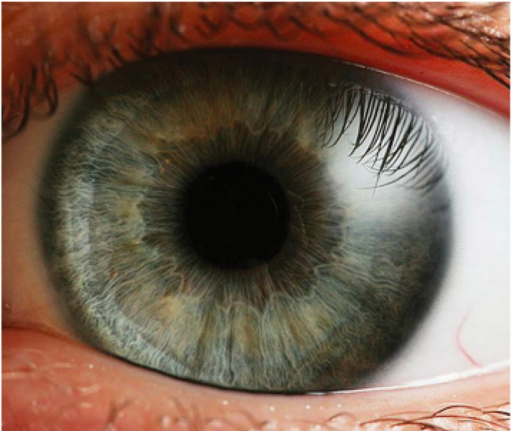
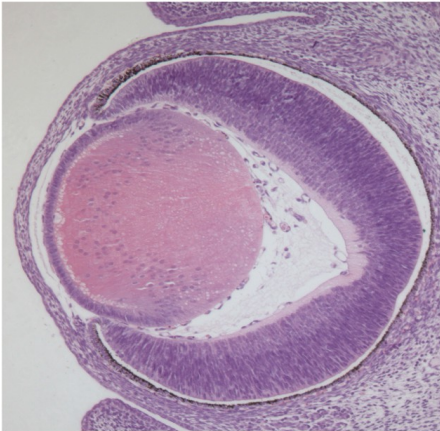


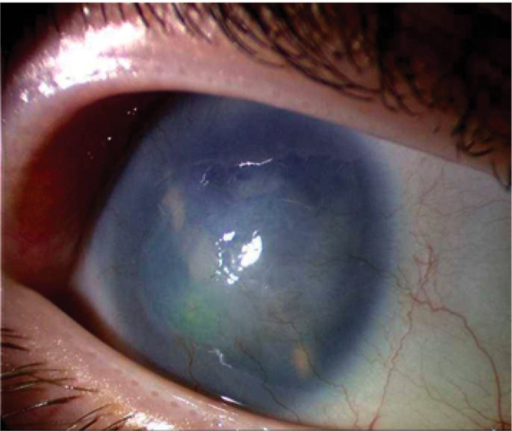
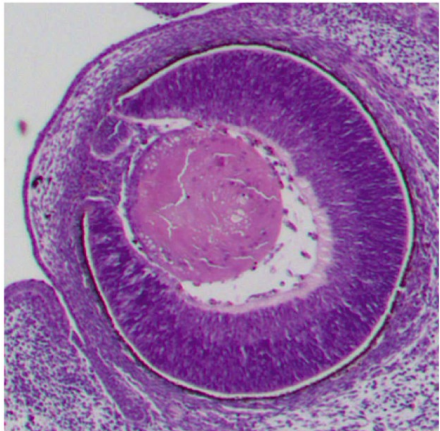
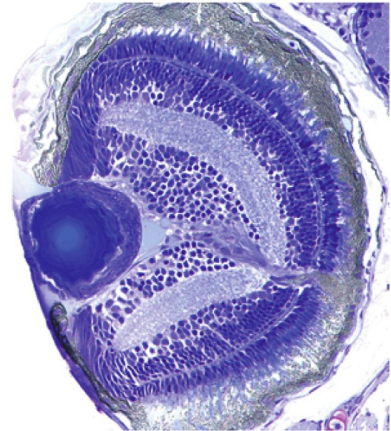
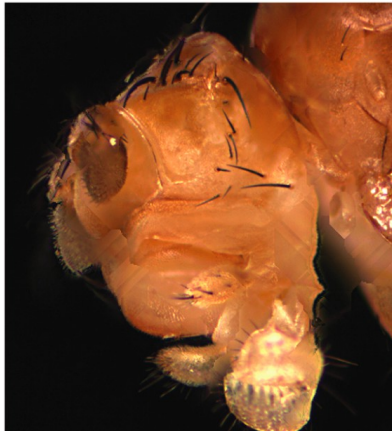
embed search-engine friendly metadata in web pages

extend S0 support to other ontologies to describe data model

generate RDF in bulk and piecemeal

improve data license handling


Explore: Pax6

	Human	Mouse	Zebrafish	<i>Drosophila</i>
WT				
mut				
	<i>PAX6</i> ^{+/-}	<i>Pax6</i> ^{-/-}	<i>pax6b</i> ^{-/-}	<i>ey</i> ^{-/-}
EQs	cornea opaque iris absent retina degenerate lens opaque aqueous humor of eyeball increased pressure	eye decreased size lens fused_to cornea iris morphology anterior chamber absent	eye decreased size lens decreased size retina malformed	eye absent

Washington NL, Haendel MA, Mungall CJ, Ashburner M, Westerfield M, Lewis SE. - Figure 1 of Washington et al.:


"Linking Human Diseases to Animal Models Using Ontology-Based Phenotype Annotation." *PLoS Biol* 7(11): e1000247. doi:10.1371/journal.pbio.1000247

HumanMine Home Page

 **HumanMine** v3.0 2016 July An integrated database of *Homo sapiens* genomic data [help](#) | [about](#)

[Home](#) [Templates](#) [Lists](#) [QueryBuilder](#) [Regions](#) [Data Sources](#) [API](#) [MyMine](#) [Contact Us](#) | [Log in](#)


Search: [GO](#)



Search

Search HumanMine. Enter **names, identifiers or keywords** for genes, proteins, pathways, ontology terms, authors, etc. (e.g. *eve*, PPARG_HUMAN, glycolysis, ACTN2).

[SEARCH](#)



Analyse

Enter a **list** of identifiers.

Gene

e.g. PPARG, FTO, 3949, LEP, 946, MC3R, 9607, LPL, LDLR, P55916, 335, GLUT4, Notch1, SLC27A1

[advanced](#)

[ANALYSE](#)

Welcome Back!

HumanMine integrates many types of data for *Homo sapiens* and *Mus musculus*. You can run flexible queries, export results and analyse lists of data.

[TAKE A TOUR](#)


[GENES](#) [PROTEINS](#) [SNPS](#) [DISEASES](#) [FUNCTION](#) [INTERACTIONS](#) [HOMOLOGY](#)

HumanMine loads Gene models and sequence from ENSEMBL. We additional cross-reference Gene information from many additional sources. [Read more](#)

Query for genes:

- GO term ➔ Genes
- Gene ➔ GO terms.
- Human Disease ➔ [Human +] Orthologue Gene(s)

Pax6 Report Page

 **HumanMine** v3.0 2016 July An integrated database of *Homo sapiens* genomic data

help | about | cite | softw

Home Templates Lists QueryBuilder Regions Data Sources API MyMine

Contact Us | Log in

Search: GO

Gene : PAX6 *Homo sapiens*

Name	paired box 6	Brief Description	paired box 6
synonyms:	FVH1, D11S812E, aniridia, keratitis, AN, AN2, AN, PAX6, WAGR, AN2, uc021qfm.1, AY707088, Show more		
identifiers:	5080, ENSG00000007372, PAX6		
Region:	gene	Length: 33170	FASTA...
Location:	11:31784792-31817961 reverse strand		

9 Pathways
Reactome, KEGG

10 Diseases
OMIM

42 Mouse Alleles (MGI)
mouse alleles

75 Gene Ontology

Tissue ↑14↓20 Genes Expression Disease ↑15↓8

[SHARE](#)

Quick Links: [Summary](#) [Function](#) [Genomics](#) [Proteins](#) [SNPs](#) [Disease](#) [Homology](#) [Interactions](#) [Gene Ontology](#) [Other](#)

Curated comments from UniProt

Type	Comment
developmental stage	Expressed in the developing eye and brain. Expression in the retina peaks at fetal days 51-60. At 6-week old, in the retina, is predominantly detected in the neural layer (at protein level). At 8- and 10-week old, in the retina, the expression is strongest in the inner and middle layer of the neural part (at protein level).
disease	MIM:106210; Aniridia; AN; A congenital, bilateral, panocular disorder characterized by complete absence of the iris or extreme iris hypoplasia. Aniridia is not just an isolated defect in iris development but it is associated with macular and optic nerve hypoplasia, cataract, corneal changes, nystagmus. Visual acuity is generally low but is unrelated to the degree of iris hypoplasia. Glaucoma is a secondary problem causing additional visual loss over time. The disease is caused by mutations affecting the gene represented in this entry.
disease	MIM:120200; Coloboma, ocular, autosomal dominant; COAD; A set of malformations resulting from abnormal morphogenesis of the optic cup and stalk, and the fusion of the fetal fissure (optic fissure). The clinical presentation is variable. Some individuals may present with minimal defects in the anterior iris leaf without other ocular defects. More complex malformations create a combination of iris, uveoretinal and/or optic nerve defects without or with microphthalmia or even anophthalmia. The disease is caused by mutations affecting the gene represented in this entry.

[Show proteins](#)

Lists

This Gene isn't in any lists.
[Upload a list.](#)

Links to other Mines

RatMine

R. norvegicus
[Pax6](#)

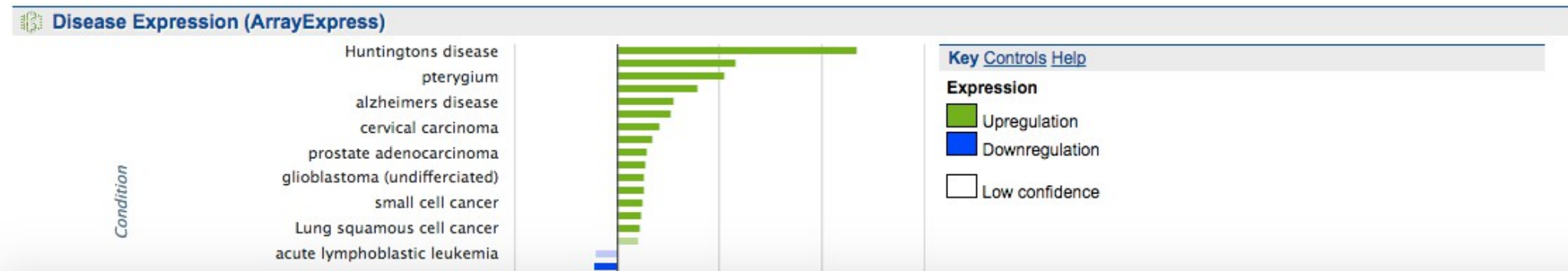
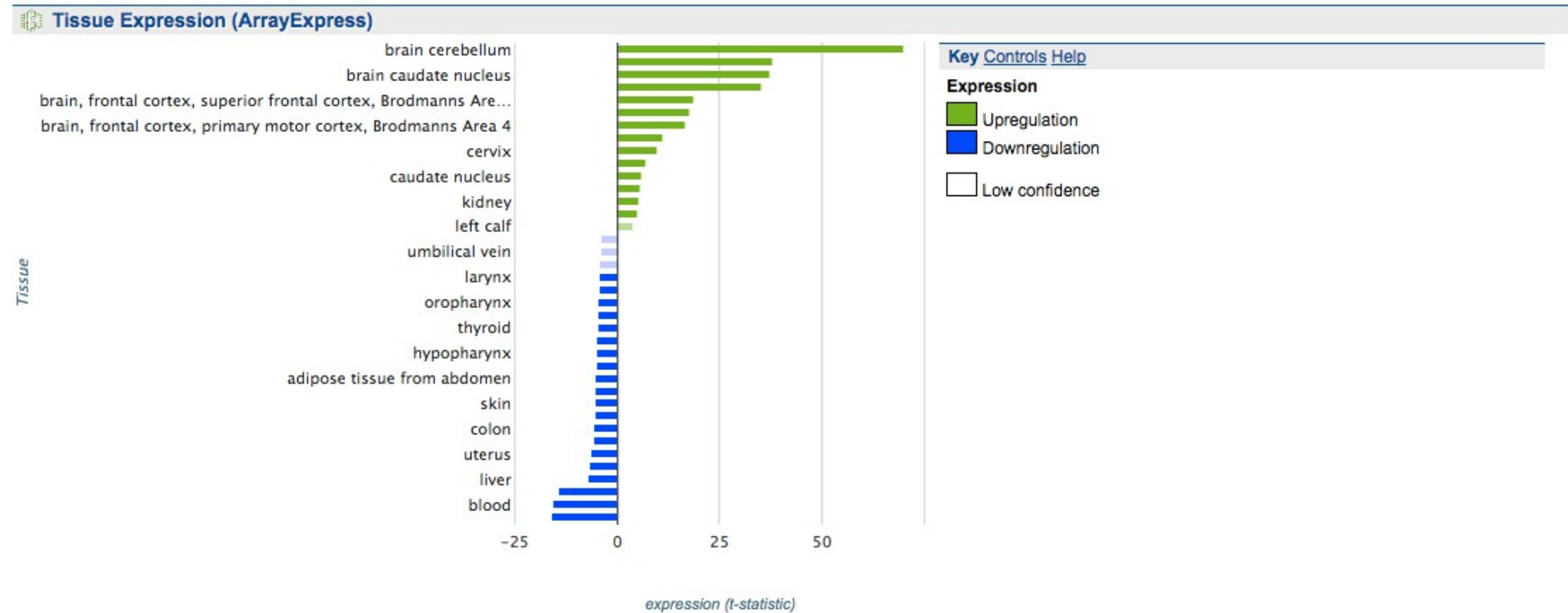
YeastMine No results

FlyMine

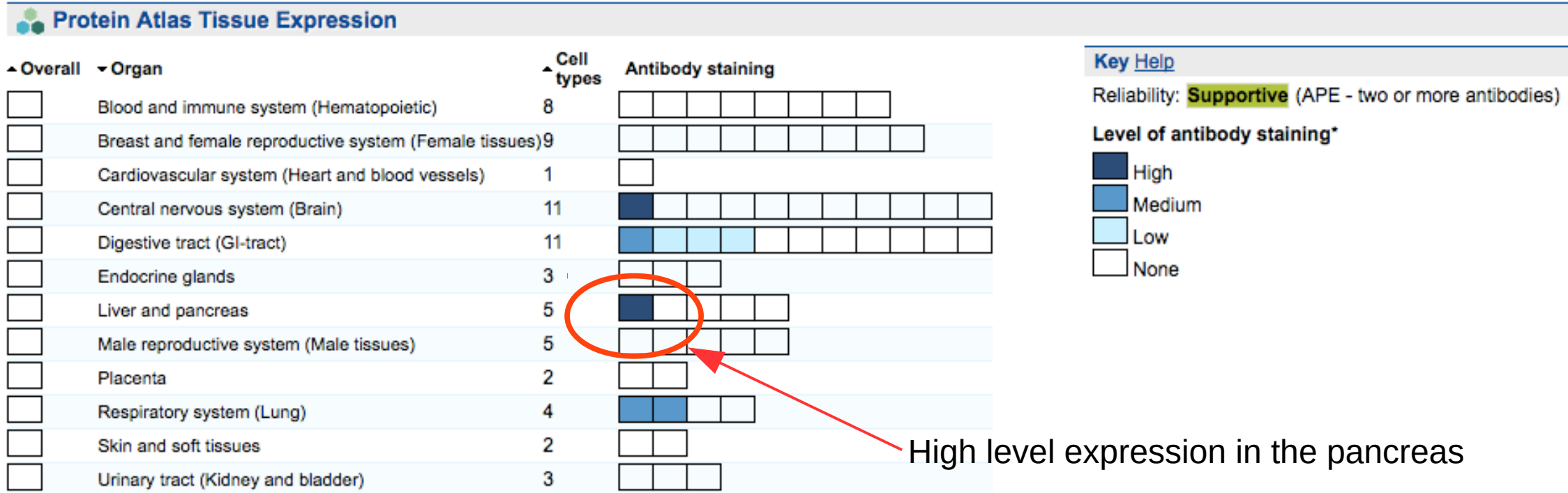
D. melanogaster
[toy](#), [ey](#)

MouseMine

Pax6 – HumanMine Expression Data



Pax6 – humanMine protein expression data



Pax6 – jump to another InterMine

Links to other Mines

modMine
D. melanogaster
toy , ey 
C. elegans
vab-3 

RatMine
R. norvegicus
Pax6 

YeastMine No results

FlyMine
D. melanogaster
toy , ey 

MouseMine
M. musculus
Pax6 

ZebrafishMine
D. rerio
ZDB-GENE-990415-200 

External Links
HuGe 
ArrayExpress Atlas 
ensembl 
BioGPS 
HapMap 
Entrez Gene 
BioGRID 

Link to orthologous gene in MouseMine

Pax6 – mouseMine report page

Gene : Pax6 paired box 6

Primary Identifier	MGI:97490	Organism	Mus musculus
Chromosome	2	NCBI Gene Number	18508
Mgi Type	protein coding gene		
description	Null and hypomorphic mutants show a range of phenotypes from viable with small eyes and lens/cornea fusion to microphthalmia and cataract to embryonic or perinatal lethality with anophthalmia and severe craniofacial and forebrain defects.		
synonyms:	AEY11, RIKEN cDNA 1500038E17 gene, gsf abnormal eyes 11, MGI:3529952, MGD-MRK-8831, Show more		
earliestPublication:	Roberts RC (1967) Small-eyes, a new dominant mutant in the mouse. Genet Res 9:121-122		
SHARE			

Quick Links: [Summary](#) [Genome](#) [Proteins](#) [Function](#) [Homology](#) [Interactions](#) [Expression](#) [Phenotype](#) [Disease](#) [Literature](#) [Other](#)

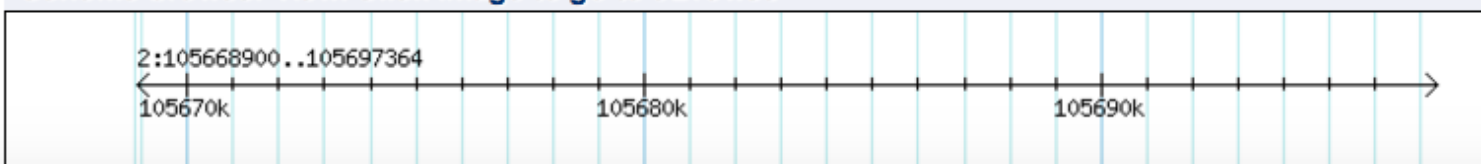
 [Features --> Cross References](#) (159 rows)

Genome

Genome feature

Region:	protein_coding_gene	Length:	28465
Location:	2:105668900-105697364 forward strand		

Genome browser view. [Click image to go to JBrowse](#)



Lists

This Gene isn't in any lists.
[Upload a list.](#)

Links to other Mines

modMine

D. melanogaster
[toy](#), [ey](#)
C. elegans
[vab-3](#)

RatMine

R. norvegicus
[Pax6](#)

YeastMine

No results

FlyMine

D. melanogaster
[toy](#), [ey](#)

Pax6 – mouseMine expression data

Expression

Gene --> Expression annotations (1941 rows)

☐ Manage Columns
 ☐ Manage Filters
 ☐ Manage Relationships

Showing 1 to 25 of 1,941 rows

Rows per page: 25

GXD Expression Assay Type	Feature Symbol	Feature Primary Identifier	GXD Expression Stage	GXD Expression Age	Structure Name	GXD Expression Strength	GXD Expression Pattern	Genotype Symbol	GXD Expression Sex	GXD Expression Assay Id	GXD Expression Probe	GXD Expression Image	Publication Mgi Jnum
Immunohistochemistry	Pax6	MGI:97490	TS17	E10.5	future spinal cord	Present	Not Specified	NO VALUE	Not Specified	MGI:1278437	MGI:1928078	NO VALUE	J:49164
Immunohistochemistry	Pax6	MGI:97490	TS17	E10.5	future spinal cord	Present	Regionally restricted	Gli2<tm1Alj>/Gli2<tm1Alj>	Not Specified	MGI:1278437	MGI:1928078	6D	J:49164
Immunohistochemistry	Pax6	MGI:97490	TS17	E10.5	future spinal cord	Present	Regionally restricted	Gli2<tm1Alj>/Gli2<tm1Alj>	Not Specified	MGI:1278437	MGI:1928078	6E	J:49164
Immunohistochemistry	Pax6	MGI:97490	TS17	E10.5	future spinal cord	Present	Regionally restricted	Gli2<tm1Alj>/Gli2<tm1Alj>	Not Specified	MGI:1278437	MGI:1928078	NO VALUE	J:49164
Immunohistochemistry	Pax6	MGI:97490	TS17	E10.5	hindbrain	Present	Regionally restricted	Gli2<tm1Alj>/Gli2<tm1Alj>	Not Specified	MGI:1278437	MGI:1928078	6B	J:49164
Immunohistochemistry	Pax6	MGI:97490	TS17	E10.5	hindbrain	Present	Regionally restricted	NO VALUE	Not Specified	MGI:1278437	MGI:1928078	6A	J:49164
Immunohistochemistry	Pax6	MGI:97490	TS17	E10.5	hindbrain	Present	Regionally restricted	NO VALUE	Not Specified	MGI:1278437	MGI:1928078	6C	J:49164

Pax6 – mouseMine expression data

Structure Name	GXD	GXD	GXD	GXD	Expression Sex
future spir cord					Not Specified
future spir cord					Not Specified
future spir cord					Not Specified
future spir cord					Not Specified
hindbrain					Not Specified
hindbrain					Not Specified
hindbrain					Not Specified
hindbrain					Not Specified
neural tube					Not Specified
neural tube					Not Specified
tail future spinal cord	Present	Not Specified	NO VALUE		Not Specified
tail future	Present	Regionally	Gli2<tm1Alj>/Gli2<tm1Alj>		Not Specified

266 EMAPA Term Names

Filter values

EMAPA Term Name	Count
<input type="checkbox"/> telencephalon	146
<input type="checkbox"/> diencephalon	84
<input type="checkbox"/> neural tube	79
<input type="checkbox"/> forebrain	57
<input type="checkbox"/> thalamus	55
<input type="checkbox"/> cerebral cortex	45
<input type="checkbox"/> future spinal cord	43
<input type="checkbox"/> eye	42
<input type="checkbox"/> embryo	33
<input type="checkbox"/> midbrain	32

Filter [v] [refresh] [undo] [redo] [Download data]

FILTER



Expression Age	Structure Name	GXD	GXD	GXD	Expression Sex
E10.5	future spir cord				Not Specified
E10.5	future spir cord				Not Specified
E10.5	future spir cord				Not Specified
E10.5	future spir cord				Not Specified
E10.5	hindbrain				Not Specified
E10.5	hindbrain				Not Specified
E10.5	hindbrain				Not Specified
E10.5	hindbrain				Not Specified
E10.5	hindbrain				Not Specified
E10.5	neural tube	Moderate	Regionally restricted	Gli2<tm1Alj>/Gli2<tm1Alj>	Not Specified
E10.5	neural tube	Present	Regionally restricted	Gli2<tm1Alj>/Gli2<tm1Alj>	Not Specified

266 EMAPA Term Names

9 Items Selected

pancreas

EMAPA Term Name	Count
<input checked="" type="checkbox"/> pancreas	9
<input type="checkbox"/> pancreas primordium	2
<input type="checkbox"/> pancreas trunk epithelium	1

Filter [v] [refresh] [undo] [redo] [Download data]

Pax6 – mouseMine expression data

Expression

Gene --> Expression annotations (1941 rows)

☐ Manage Columns
 ☐ Manage Filters
 ☐ Manage Relationships

Showing 1 to 9 of 9 rows

GXD Expression Assay Type	Feature Symbol	Feature Primary Identifier	GXD Expression Stage	GXD Expression Age	Structure Name	GXD Expression Strength	GXD Expression Pattern	Genotype Symbol	GXD Expression Sex	GXD Expression Assay Id	GXD Expression Probe	GXD Expression Image	Publication Mgi Jnum
RNA in situ	Pax6	MGI:97490	TS22	E14.5	pancreas	Present	Not Specified	Fgfr2<tm1.1Dsn>/Fgfr2<tm1.1Dsn>	Not Specified	MGI:2676276	MGI:2676280	4C,G	J:82083
RNA in situ	Pax6	MGI:97490	TS22	E14.5	pancreas	Present	Not Specified	NO VALUE	Not Specified	MGI:2676276	MGI:2676280	4K,O	J:82083
RT-PCR	Pax6	MGI:97490	TS28	postnatal adult	pancreas	Present	NO VALUE	NO VALUE	Not Specified	MGI:2686871	MGI:2686868	NO VALUE	J:54475
RT-PCR	Pax6	MGI:97490	TS28	postnatal adult	pancreas	Present	NO VALUE	NO VALUE	Not Specified	MGI:2686872	MGI:2686869	NO VALUE	J:54475
Northern blot	Pax6	MGI:97490	TS28	postnatal adult	pancreas	Absent	NO VALUE	NO VALUE	Not Specified	MGI:3033144	MGI:16158	NO VALUE	J:886
RNA in situ	Pax6	MGI:97490	TS22	E14.5	pancreas	Strong	Regionally restricted	NO VALUE	Not Specified	MGI:3767157	MGI:3724381	5 Pax6	J:127119
RNA in situ	Pax6	MGI:97490	TS23	E14.5	pancreas	Strong	Regionally restricted	NO VALUE	Not Specified	MGI:4827065	MGI:3724381	euxassay_017942_11	J:153498
RNA in situ	Pax6	MGI:97490	TS23	E14.5	pancreas	Strong	Regionally restricted	NO VALUE	Not Specified	MGI:4827065	MGI:3724381	euxassay_017942_12	J:153498
RNA in situ	Pax6	MGI:97490	TS22	E14.5	pancreas	Strong	Regionally restricted	NO VALUE	Not Specified	MGI:5421041	MGI:3724381	MH454; Specimen C1193	J:122989

Analyse: Pax6

- What other genes are involved in pancreatic function?
- Have these genes been implicated in pancreatic disease?
- Are there potential targets of pax6 in pancreatic tissue?
- What published data is there about these genes?

Data Analysis: Template Searches

The template searches allow a more refined search than the keyword search and report pages but are still quick and easy to access.

- Pre-defined searches with simple filters
- Range from simple searches to more complex searches spanning several data types
- Run with single item or list
- Results are returned in sophisticated results tables
- Easy to add - just ask

Data Analysis: Template Searches

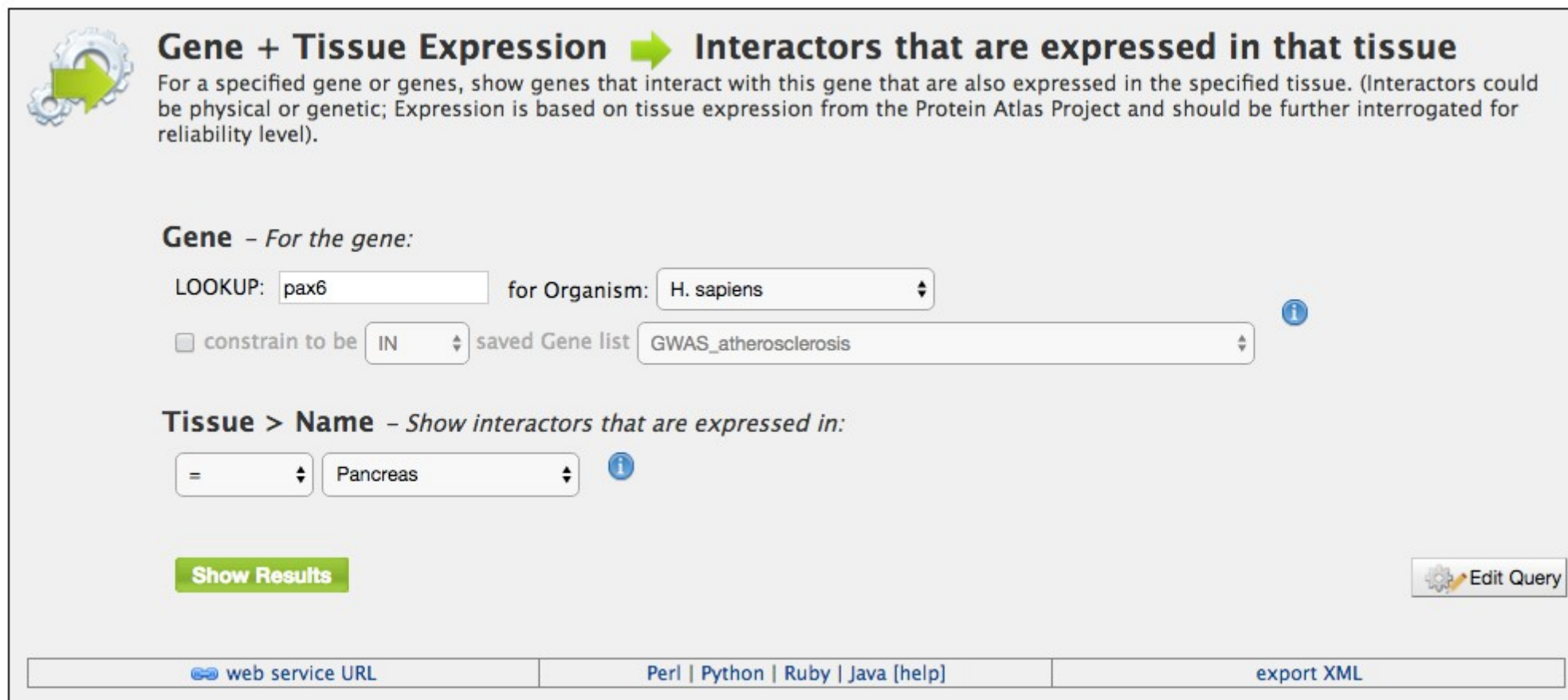
- What other genes are involved in pancreatic function?
- Have these genes been implicated in pancreatic disease?
- Are there potential targets of pax6 in pancreatic tissue?
- What published data is there about these genes?

Data Analysis: Template Searches

Are there potential targets of pax6 in pancreatic tissue?

Template:

Gene + Tissue Expression → Interactors that are expressed in that tissue



Gene + Tissue Expression → **Interactors that are expressed in that tissue**

For a specified gene or genes, show genes that interact with this gene that are also expressed in the specified tissue. (Interactors could be physical or genetic; Expression is based on tissue expression from the Protein Atlas Project and should be further interrogated for reliability level).

Gene – For the gene:

LOOKUP: for Organism:

☐ constrain to be saved Gene list

Tissue > Name – Show interactors that are expressed in:

[Show Results](#) [Edit Query](#)

[web service URL](#) [Perl](#) | [Python](#) | [Ruby](#) | [Java \[help\]](#) [export XML](#)

Results Tables: Filter results (refine)

Gene + Tissue Expression → Interactors that are expressed in that tissue ☆

For a specified gene or genes, show genes that interact with this gene that are also expressed in the specified tissue. (Interactors could be physical or genetic; Expression is based on tissue expression from the Protein Atlas Project and should be further interrogated for reliability level).

Manage Columns

Manage Filters

Manage Relationships

Save as List

Generate Python code

Export

Showing 1 to 25 of 66 rows

Rows per page: 25

page 1

Gene Primary Identifier	Gene Symbol	Interactions Participant 2 . Primary Identifier	Participant 2 Symbol	Protein Atlas Expression Tissue . Name	Protein Atlas Expression Level
5080	PAX6	10131	TRAP1	Pancreas	High
5080	PAX6	10131	TRAP1	Pancreas	High
5080	PAX6	1045			
5080	PAX6	1045			
5080	PAX6	2033			
5080	PAX6	2033			

Gene + Tissue Expression → Interactors that are expressed in that tissue ☆

For a specified gene or genes, show genes that interact with this gene that are also expressed in the specified tissue. (Interactors could be physical or genetic; Expression is based on tissue expression from the Protein Atlas Project and should be further interrogated for reliability level).

Manage Columns

Manage Filters

Manage Relationships

Save as List

Generate Python code

Export

Showing 1 to 25 of 66 rows

Rows per page: 25

page 1

Gene Primary Identifier	Gene Symbol	Interactions Participant 2 . Primary Identifier	Participant 2 Symbol	Protein Atlas Expression Tissue . Name	Protein Atlas Expression Level
5080	PAX6	10131	TRAP1		
5080	PAX6	10131	TRAP1		
5080	PAX6	1045	CDX2		
5080	PAX6	1045	CDX2		
5080	PAX6	2033	EP300		
5080	PAX6	2033	EP300		
5080	PAX6	2037	EPB41L2		
5080	PAX6	2037	EPB41L2		
5080	PAX6	28996	HIPK2		
5080	PAX6	28996	HIPK2		
5080	PAX6	338	APOB		

4 Protein Atlas Expression Levels



29 Items Selected



Filter values

Protein Atlas Expression Level	Count
<input type="checkbox"/> Not detected	28
<input checked="" type="checkbox"/> Medium	19
<input checked="" type="checkbox"/> High	10
<input type="checkbox"/> Low	9

Filter



Download data

Data Analysis: Template Searches

Trail: Query

Gene + Tissue Expression → Interactors that are expressed in that tissue

For a specified gene or genes, show genes that interact with this gene that are also expressed in the specified tissue. (Interactors could be physical or genetic; Expression is based on tissue expression from the Protein Atlas Project and should be further interrogated for reliability level).

☐ Manage Columns ☐ Manage Filters ☐ Manage Relationships

Showing 1 to 25 of 29 rows

Rows per page: 25

page 1

Gene Primary Identifier	Gene Symbol	Interactions Participant 2 . Primary Identifier	Participant 2 Symbol	Protein Atlas Expression Tissue . Name	Protein Atlas Expression Level
5080	PAX6	10131	TRAP1	Pancreas	High
5080	PAX6	10131	TRAP1	Pancreas	High
5080	PAX6	2033	EP300	Pancreas	Medium
5080	PAX6	2033	EP300	Pancreas	Medium
5080	PAX6	28996	HIPK2	Pancreas	Medium

Trail: Query

Gene + Tissue Expression → Interactors that are expressed in that tissue

For a specified gene or genes, show genes that interact with this gene that are also expressed in the specified tissue. (Interactors could be physical or genetic; Expression is based on tissue expression from the Protein Atlas Project and should be further interrogated for reliability level).

☐ Manage Columns ☐ Manage Filters ☐ Manage Relationships

Showing 1 to 25 of 29 rows

Gene Primary Identifier	Gene Symbol	Interactions Participant 2 . Primary Identifier	Participant 2 Symbol	Protein Atlas Expression Tissue . Name	Protein Atlas Expression Level
5080	PAX6	10131	TRAP1	Pancreas	High
5080	PAX6	10131	TRAP1	Pancreas	High
5080	PAX6	2033	EP300	Pancreas	Medium
5080	PAX6	2033	EP300	Pancreas	Medium
5080	PAX6	28996	HIPK2	Pancreas	Medium
5080	PAX6	4089	SMAD4	Pancreas	Medium

Many Many Searches.....

- Which other genes have this GO annotation?
- Are there mutant phenotypes for this gene?
- Where is this gene expressed?
- What does this gene interact with?
- Do any of the interacting genes share the mutant phenotypes?
- Does this gene have a human orthologue with a disease association?
- Have any variants been associated with this gene/disease?
- Which organisms have models for this disease/gene?

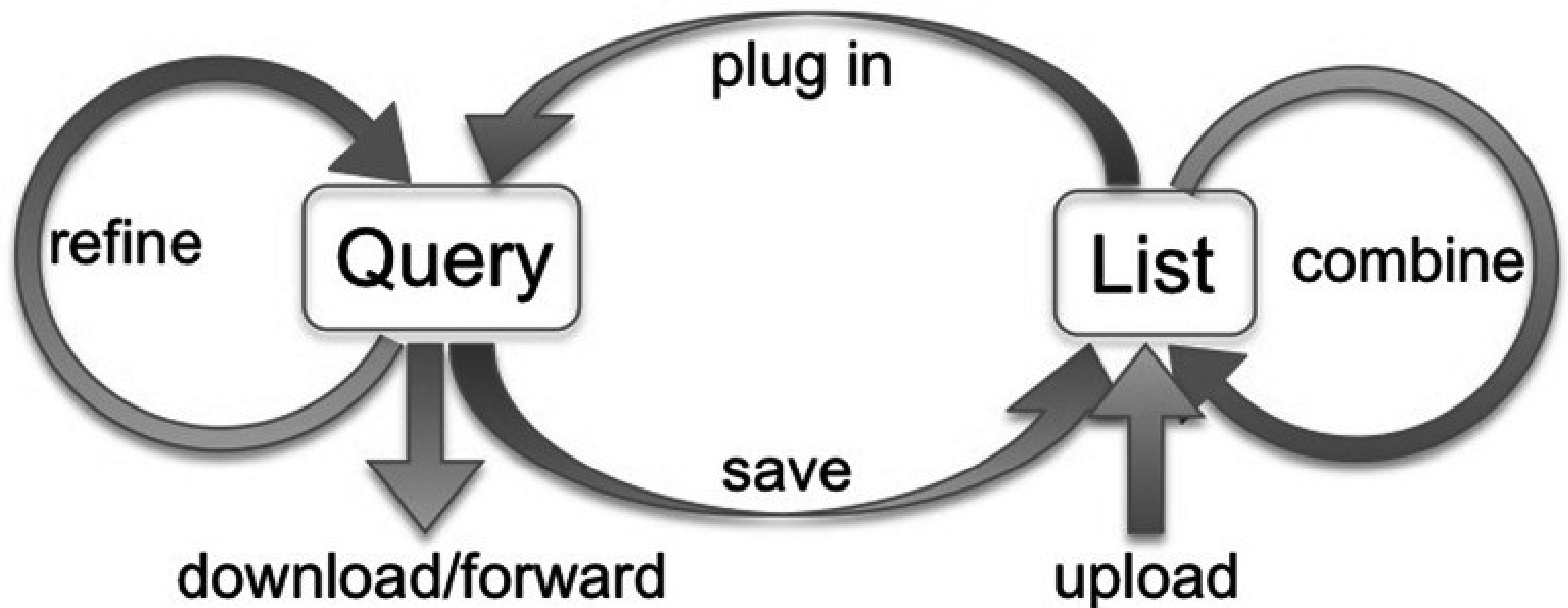
Data Exploration: List Analysis

InterMine also allows you to explore data for a whole list of objects

- Explore data for a set of objects, e.g a list of genes
- All lists have a list analysis page
- Provide summary table, widgets and search results
- Can be uploaded or created from searches
- List operations - union, intersect, subtract
- Public lists also available



Analysis Workflows



List Analysis

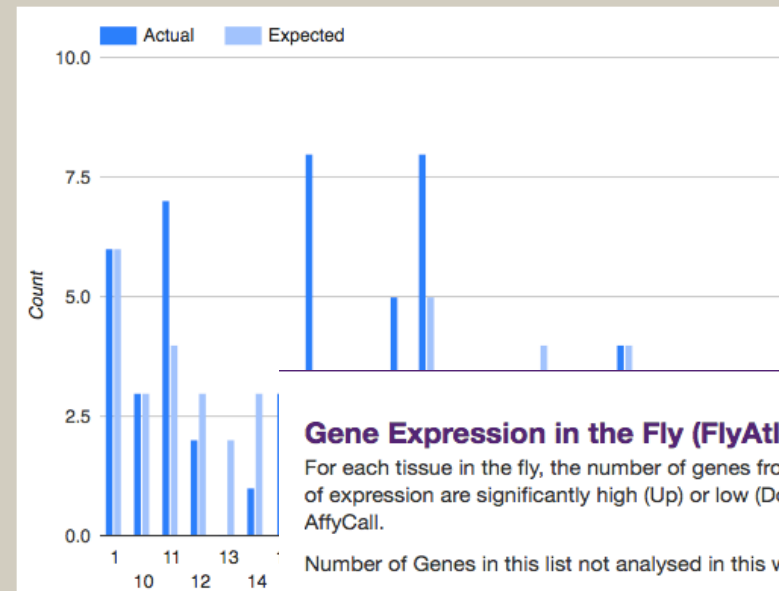
Chromosome Distribution

Actual: number of items in this list found on each chromosome. Expected: given the total number of items on the chromosome and the number of items in this list, the number of items expected to be found on each chromosome.

All items in your list have been analysed.

Organism

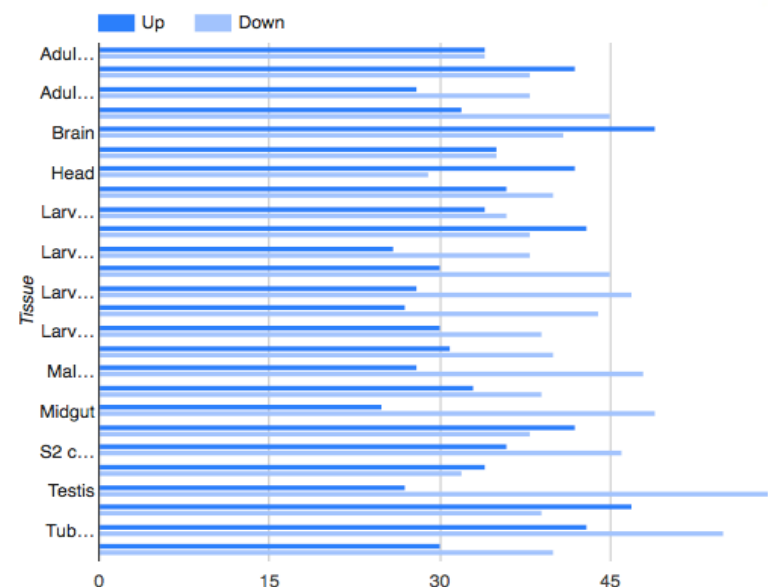
Homo sapiens



Gene Expression in the Fly (FlyAtlas)

For each tissue in the fly, the number of genes from this list for which expression are significantly high (Up) or low (Down) according to FlyAtlas.

Number of Genes in this list not analysed in this widget: 3



Gene Ontology Enrichment

GO terms enriched for items in this list.

Number of Genes in this list not analysed in this widget: 17

Test Correction Max p-value Ontology

Holm-Bonferroni 0.05 biological_process

Background population

Default Change

View Download

GO Term	p-Value	Matches
cell adhesion [GO:0007155]	8.077144e-5	13
biological adhesion [GO:0022610]		
Wnt signaling pathway [GO:0016055]		
cell-cell adhesion [GO:0098609]		
wing disc development [GO:0035220]		
cell-matrix adhesion [GO:0007160]		
tissue development [GO:0009888]		
heart development [GO:0007507]		

View homologues in other Mines:

RatMine
R. norvegicus

YeastMine
S. cerevisiae

MouseMine
M. musculus

HumanMine
H. sapiens

ZebrafishMine
D. rerio

Mammalian Phenotype Ontology Enrichment

MP terms enriched for items in this list.

Number of Genes in this list not analysed in this widget: 72

Test Correction Max p-value Background population

Holm-Bonferroni 0.05 Default Change

View Download

MP Term	p-Value	Matches
abnormal DNA repair [MP:0008058]	1.831867e-66	52
increased sensitivity to induced cell death [MP:0008943]	1.383230e-62	59
abnormal induced cell death [MP:0008942]	1.175928e-60	65
abnormal chromosome stability [MP:0010094]	4.405108e-58	48
chromosomal instability [MP:0008866]	1.743731e-56	47
abnormal cell physiology [MP:0005621]	2.197659e-53	163
cellular phenotype [MP:0005384]	1.305734e-51	168
chromosome breakage [MP:0004028]	4.007892e-50	37
abnormal cell death [MP:0000313]	1.184952e-44	106

The InterMine Team

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 **InterMine**