Module 4: Function and Expression

i. How do I determine gene function?

Aims

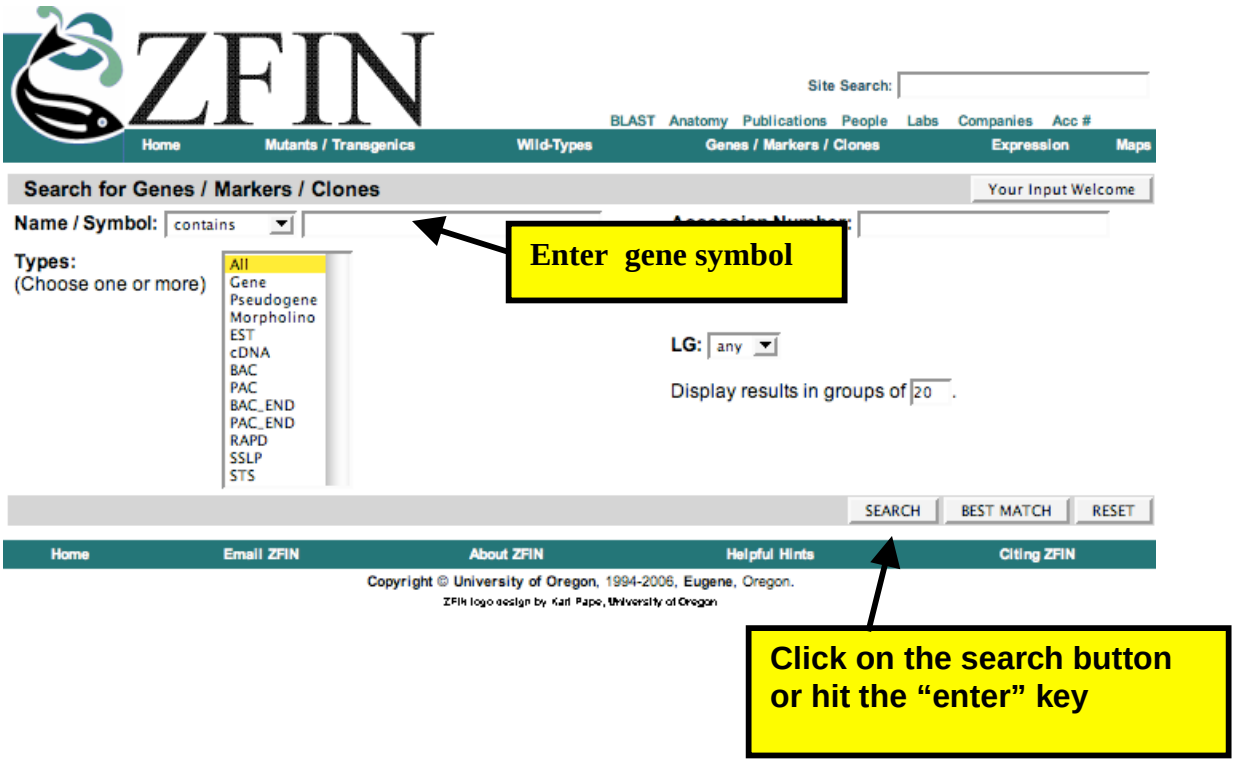
- Introduce gene ontology and gene expression data available in ZFIN
- Describe how to find these data

Introduction

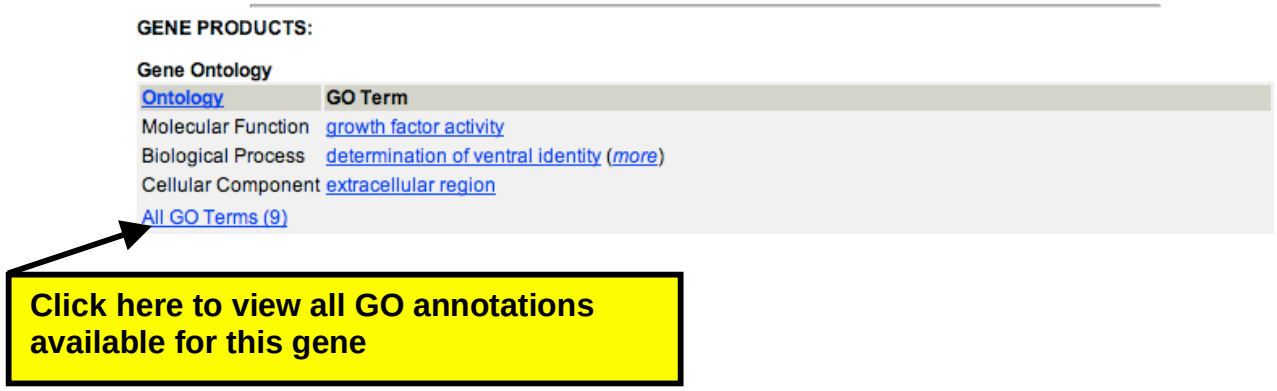
Gene Ontology (GO, http://www.geneontology.org/) annotations and gene expression data offer powerful insights for understanding of biological processes and gene function. GO terms are associated with genes by literature curation and by automated computational means. These terms are defined by members of the GO consortium, including ZFIN, to describe biological processes, cellular components and molecular functions of gene products. These terms can be used to describe gene products in any organism thus promoting cross-species studies.

Finding GO annotations

GO annotations are located in the **Gene Products** section of a ZFIN gene page. Locate this information using our Genes/Markers/Probes query form, http://zfin.org/cgi-bin/webdriver?MIval=aa-newmrkrselect.apg. Search by specifying your gene of interest.



Scroll down to the **Gene Products** section of the gene page.



The *bmp2b* gene page shows a representative term for each of the three ontologies. To view all terms click on 'All GO terms' link. The *bmp2b* GO details page displays all annotations for *bmp2b*.

ZFIN ID: ZDB-GENE-980526-474

GO Details

Gene Name: ***bone morphogenetic protein 2b***
Gene Symbol: ***bmp2b***

Your Input Welcome

Ontology	GO Term	Evidence	Inferred From	Reference(s)
Molecular Function	growth factor activity	IEA		2
Biological Process	cell migration during gastrulation	IGI	swr^{tc300a} MO6-wnt8a MO5-wnt8a MO4-wnt8a MO3-wnt8a	1
	cell-cell signaling during cell fate commitment	IMP		1
	determination of ventral identity	IDA		1
	determination of ventral identity	IGI	twsg1b	1
	determination of ventral identity	IGI	MO2-bmp7 MO2-bmp2b	1
	determination of ventral identity	IMP	MO2-bmp2b	1
	determination of ventral identity	TAS		1
	dorsal/ventral pattern formation	IEP		1
	dorsal/ventral pattern formation	IGI	swr^{tc300a} MO6-wnt8a MO5-wnt8a MO4-wnt8a MO3-wnt8a	1
	dorsal/ventral pattern formation	IMP	swr^{tc300a}	1
	growth	IEA		1
	mesodermal cell fate commitment	IGI	swr^{tc300a} MO6-wnt8a MO5-wnt8a MO4-wnt8a MO3-wnt8a	1
	notochord development	IGI	swr^{tc300a} MO6-wnt8a MO5-wnt8a MO4-wnt8a MO3-wnt8a	1
Cellular Component	extracellular region	IEA		1

Click here for GO term definition

Click here for GO evidence code definition

Click here for publications providing supporting evidence

You may get additional information regarding a term by following the term link. Evidence codes supporting the annotation are provided. Evidence codes are standardized by the GO consortium and allow you to determine the confidence you may want to have in each GO term association. Again you may click on the evidence code for a description. The reference supporting the annotation is also provided.

Making a GO based gene query

ZFIN's Site Search may be used for a GO based gene query can. See Module 1 for an example query.

As members of the GO consortium, we routinely make our annotations available to the centralized database maintained by the consortium. This allows you to use the GO term search engine, AmiGO http://www.godatabase.org/cgi-bin/amigo/go.cgi, made available by the GO consortium, to search for zebrafish genes and genes of other organisms that are annotated with a specified GO term.

Gene expression data

ZFIN also incorporates large datasets of high quality annotated images from laboratories performing large scale *in situ* hybridization screens, gene expression data submitted by individual investigators and gene expression data from the literature. See Module 4 ii for a complete discussion.

Morpholinos

Morpholinos, antisense oligonucleotides, have become an important method for evaluating gene function in zebrafish. ZFIN curates morpholino data from published literature and is working with the Stephen Ekker laboratory to include data from their morpholino screen. See Module 4 ii for a detailed discussion.

Exercises

- What are possible ways to infer function for my gene?
- What molecular function has been attributed to *fgf8*?
- In what biological processes is *fgf8* involved?
- With what cellular components is *fgf8* associated?
- What supporting evidence is available?