

## Module 1: Where do I start ?

### ii. ZFIN, the zebrafish model organism database

#### Aims

- Introduce ZFIN web site
- Suggest starting points for different types of queries
- Describe methods for contacting ZFIN

#### Introduction

ZFIN is the zebrafish model organism database and as such we work towards integrating zebrafish biology with its genome. Data are updated daily by the ZFIN curatorial staff who extract relevant information from your publications. Large datasets submitted by zebrafish labs, routine data exchanges with organizations such as NCBI, the Sanger Institute and Swiss-Prot, as well as data submissions from individual investigators provide additional data for ZFIN. ZFIN also participates with the Sanger Institute in annotation of the whole genome sequence.

#### ZFIN Home Page

Query forms for mutants, genes, markers, clones, mapping and gene expression data facilitate integrated analysis of these data. These forms are available from the ZFIN home page, <http://zfin.org>,

As you scroll down the ZFIN home page, take note of the links to query forms for:

- Mutants/Transgenes  
Search by name, map location, mutation type or phenotype
- Genes/Markers/Clones  
Search by name, accession number, LG, vector or sequence type
- Gene Expression  
Search by gene name, mutant background, author, developmental stage, anatomical structure or knockdown reagent gene name.
- BLAST  
Search for sequence alignment against ZFIN and zebrafish datasets
- Genetic Map  
Generate an integrated view of mapping panels or a consolidated map.
- Anatomy

Search the zebrafish anatomical dictionary.

### Mutants and Transgenes

### Genes

- Function
- Protein Families and Domains
- Probes
- Expression Patterns
- Orthologs
- Sequence Data
- Mapping Data

The ZFIN (The Zebrafish Information Network) website interface. The header features the ZFIN logo and a search bar. The main content area is divided into several sections:

- General Information:** Includes links for Positions at ZFIN, About ZFIN, Citing ZFIN, Help Resources, Contact Us, Site News, Glossary, and Download Data.
- Genomics:** Includes links for Zebrafish Genome Resources, Trans NIH, and Zebrafish Initiative.
- Anatomical Atlases:** Includes links for Meetings / Jobs, Grants, The Zebrafish Book, The Zebrafish Science Monitor, Zebrafish Newsgroup, Zebrafish for K-12, and ZFIN Newsletter.
- Nomenclature:** Includes links for Laboratory, Allele Designations, Nomenclature, and Conventions.
- Pathology Services:** Includes a link for the Disease Manual.

The central navigation menu lists the following categories with brief descriptions:

- Mutants / Transgenics:** Search for mutations / transgenic lines by gene name, map location or phenotype.
- Wild-Type Stocks:** Zebrafish wild-type lines.
- Genes / Markers / Clones:** Search for genes, markers and clones by type or sequence type.
- Gene Expression:** Search for gene expression patterns by anatomical structure, developmental stage, or gene.
- BLAST:** Search for sequence alignment against ZFIN datasets and Zebrafish datasets.
- Genetic Maps:** Generate graphical views of genetic, radiation hybrid or consolidated maps.
- Mapping Panels:** Summary listing of zebrafish mapping panels.
- Accession #:** Search ZFIN by data accession number.
- Publications:** Search for zebrafish research publications.
- Anatomy:** Search the zebrafish anatomical ontology.
- People:** Search for zebrafish researchers by name or address.
- Laboratories:** Search for laboratories by name, address or research interests.
- Companies:** Search for companies supplying zebrafish reagents.

At the bottom, there is a login section with fields for "Login:" and "Password:", a "Log in" button, and a note: "(Login required only to update personal records)".

### Search for sequence alignment

### Gene Expression Patterns

### Graphical representation of mapping panels

### Anatomical Dictionary with links to associated gene expression patterns

### Zebrafish Research Community Contact Information



Links to additional resources are provided on the ZFIN home page side bar.

The image shows the ZFIN home page with several callout boxes pointing to specific links and sections:

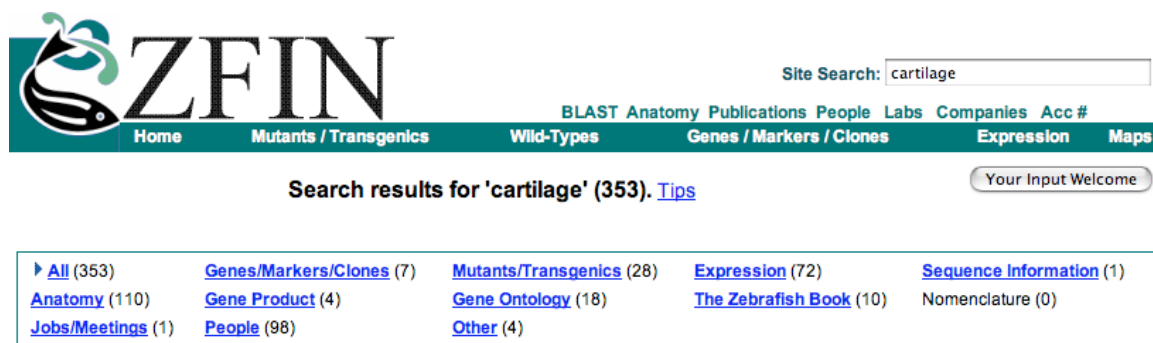
- Send questions and suggestions to ZFIN**: Points to the "Contact Us" link in the General Information section.
- Download ZFIN data files for use in Excel or other databases**: Points to the "Download Data" link in the General Information section.
- Meetings and Jobs**: Points to the "Meetings / Jobs" link in the Information and News section.
- Zebrafish Newsgroup**: Points to the "Zebrafish Newsgroup" link in the Information and News section. The box lists:
  - Submit questions
  - Share protocols
- Nomenclature guidelines**: Points to the "Nomenclature" link in the Nomenclature section. The box lists:
  - Order Fish, Probes
  - Submit Lines
  - Pathology Services
- Zebrafish International Resource Center**: Points to the "Info, Strains, Probes" link in the Zebrafish Resource Center section. The box lists:
  - Order Fish, Probes
  - Submit Lines
  - Pathology Services

The ZFIN home page includes a search bar at the top right, a sidebar with navigation links, and a main content area with various resources categorized by topic.

## Site Search

Site Search is a quick way to search the entire ZFIN website. It's easy – you'll find the search box in the upper right hand corner of every ZFIN page - just enter words in the search box and press return.

The features of site search are shown in this example search for **cartilage**. The top of the results page displays a box where results are sorted into several different data categories. Categories help you narrow your search. The currently-selected category is marked with an arrowhead (▶). The number beside each category is the number of pages found. Look inside the categories box. Next to "All", you can see that there are 353 ZFIN pages containing the word "cartilage". 28 of these are Mutant/Transgenic pages.



The screenshot shows the ZFIN website interface. At the top left is the ZFIN logo. To the right is a search bar with the text "Site Search: cartilage". Below the search bar is a navigation menu with links: Home, Mutants / Transgenics, Wild-Types, Genes / Markers / Clones, Expression, Maps, BLAST, Anatomy, Publications, People, Labs, Companies, and Acc #. Below the navigation menu is a section titled "Search results for 'cartilage' (353). [Tips](#)". To the right of this section is a button that says "Your Input Welcome". Below the search results section is a table with categories and their respective counts:

|                                   |  |  |   |  |
|-----------------------------------|--|--|---|--|
| ▶ All (353)                       | <a href="#">Genes/Markers/Clones</a> (7) | <a href="#">Mutants/Transgenics</a> (28) | <a href="#">Expression</a> (72)         | <a href="#">Sequence Information</a> (1) |
| <a href="#">Anatomy</a> (110)     | <a href="#">Gene Product</a> (4)         | <a href="#">Gene Ontology</a> (18)       | <a href="#">The Zebrafish Book</a> (10) | Nomenclature (0)                         |
| <a href="#">Jobs/Meetings</a> (1) | <a href="#">People</a> (98)              | <a href="#">Other</a> (4)                |   |  |

Click the Mutants/Transgenics category to find mutant fish pages containing the word "**cartilage**". The *dirty south* locus page is in this group because the word "cartilage" is contained in the phenotype description.

### [Locus: dirty south](#)

... some ventral **cartilages** reduced or absent), underdeveloped liver/gut. CITATIONS (1) Home Email ZFIN About ZFIN Helpful Hints ...

[/cgi-bin/almost/webdriver?Mval=aa-locusview.apg&OID=ZDB-LOCUS-040927-5](#)

The Gene Ontology (GO) category is a good place to look for genes related to cartilage. Here you see that *sox9b* has been annotated with the GO term 'cartilage development'. Follow the GO details link for *sox9b* to learn that this annotation was inferred from deficiency mutant phenotypes and morpholino experiments.

### [GO Details: sox9b](#)

... s) Molecular Function DNA binding IEA 1 Biological Process **cartilage** development IMP MO3-sox9b MO2-sox9b 1 **cartilage** development IMP Df(LG03)sox8,sox9b b971 1 embryonic pectoral fin morphogenesis ...

[/cgi-bin/almost/webdriver?Mval=aa-markergoview.apg&OID=ZDB-GENE-001103-2](#)

**Cartilage** appears many times in the zebrafish anatomical ontology. Follow the links in the Anatomy category to view definitions, possible probes and expressed genes.

### [Anatomical Structure: ceratobranchial](#)

... Definition: Ceratobranchials are bilaterally paired **cartilage** bones that form part of the ventral ... with the epibranchials. Ceratobranchials 1-5 ossify in the ceratobranchial **cartilages**. Appears ...

[/cgi-bin/almost/webdriver?Mval=aa-anatomy\\_item.apg&OID=ZDB-ANAT-011113-411](#)

You might even find a cartilaginous job with Site Search – check the Jobs/Meetings category.

## Site Search vs. Topic Specific Search

Site Search complements ZFIN's topic specific searches but it is important to understand the differences. Site search looks for word matches on ZFIN web pages. It's fast and it covers the entire database, but it's not very smart. The domain-specific searches *are* smart – they are designed take advantage of domain-specific associations between terms. For example, if you enter “brain” in the anatomy field of the domain-specific Gene Expression search page, your results will include all figures with cerebellar gene expression. Gene Expression search “knows” that the cerebellum is part of the brain. In contrast, the expression category of a Site Search for “brain” will return figures only if the word “brain” appears in figure captions, gene names or anatomical structures, as shown in the example below:

Expression search results for 'brain' (1059). [Tips](#)

Advanced search: [Expression](#)

**Click here for topic specific search**

|                              |  |   |   |   |
|------------------------------|--|---|---|---|
| <a href="#">All</a> (3073)   | <a href="#">Genes/Markers/Clones</a> (653) | <a href="#">Mutants/Transgenics</a> (681) | <a href="#">Expression</a> (1059)       | <a href="#">Sequence Information</a> (17) |
| <a href="#">Anatomy</a> (52) | <a href="#">Gene Product</a> (59)          | <a href="#">Gene Ontology</a> (53)        | <a href="#">The Zebrafish Book</a> (21) | Nomenclature (0)                          |
| Jobs/Meetings (0)            | <a href="#">People</a> (463)               | <a href="#">Other</a> (15)                |   |   |

Exact Match: [brain](#)

[Figure: Chou et al., 2006, Fig. 2](#)

... Expression and characterization of a **brain-specific** protein kinase BSK146 from zebrafish. Biochem ...  
Anatomical Terms: **brain** , embryo , unspecified Stage Range : 5-9 somites to Adult Fig. 2 ZFIN is incorporating ...  
Not detected embryo RTPCR Prim-5 to Day 6 unspecified RTPCR Adult **brain** RTPCR Home Email ZFIN About  
ZFIN Helpful Hints ...

[/cgi-bin\\_almost/webdriver?Mlval=aa-fxfigureview.apg&OID=ZDB-FIG-060313-4](#)

For a more detailed search, follow the ‘Advanced search: Expression’ link to the ZFIN topic specific gene expression search. As a convenience, “brain” will be automatically entered into the anatomy field of the expression search form.

## Synonyms

When a synonym or previous name is entered into Site Search, you are provided with an Alternative search suggestion link. Click this link to start a fresh Site Search using the primary name of the term. This is worth a try, because it will typically provide you with overlapping and complementary results. Examples below:

*pou2* is a previous name for *pou5f1*. Site search for *pou2* produces *pou2* results and an optional alternative search for *pou5f1* :



Search results for 'pou2' (35). [Tips](#)

Alternative search: [pou5f1](#) (pou2)

Click here for suggested alternate search

|                   |  |                                   |                                |
|-------------------|--|-----------------------------------|--------------------------------|
| ▶ All (35)        | <a href="#">Genes/Markers/Clones</a> (9) | Mutants/Transgenics (0)           | <a href="#">Expression</a> (2) |
| Anatomy (0)       | <a href="#">Gene Product</a> (2)         | <a href="#">Gene Ontology</a> (1) | The Zebrafish Book (0)         |
| Jobs/Meetings (0) | <a href="#">People</a> (20)              | Other (0)                         | Nomenclature (0)               |

Follow the alternate search link to find matches to *pou5f1*.

Search results for 'pou5f1' (38). [Tips](#)

Your Input Welcome

|                   |  |  |                                 |  |
|-------------------|--|--|---------------------------------|--|
| ▶ All (38)        | <a href="#">Genes/Markers/Clones</a> (5) | <a href="#">Mutants/Transgenics</a> (11) | <a href="#">Expression</a> (13) | <a href="#">Sequence Information</a> (1) |
| Anatomy (0)       | <a href="#">Gene Product</a> (1)         | <a href="#">Gene Ontology</a> (2)        | The Zebrafish Book (0)          | Nomenclature (0)                         |
| Jobs/Meetings (0) | <a href="#">People</a> (5)               | Other (0)                                |                                 |  |

Exact Match: [pou5f1](#)

[Gene: pou5f1](#)

... factor 1 Gene Symbol: **pou5f1** Previous Names: chunp6868 ; pou2 ... KNOCKDOWNS: Mutant locus: spiel ohne grenzen (spg) has been shown to correspond to gene **pou5f1** ... SEGMENT (CLONE AND PROBE) RELATIONSHIPS: **pou5f1** Encodes [EST] cb197 ( order this ) , fd18d06 ...  
[/cgi-bin/almost/webdriver?Mlval=aa-markerview.apg&OID=ZDB-GENE-980526-485](#)

Similarly, entering a previous/alternate name for an anatomy term ("isthmus") will provide an alternative search using the primary anatomical structure name.

Search results for 'isthmus' (30). [Tips](#)

Your Input Welcome

Alternative search: [midbrain hindbrain boundary](#) (isthmus)

|                             |  |  |                                |                          |
|-----------------------------|--|--|--------------------------------|--------------------------|
| ▶ All (30)                  | <a href="#">Genes/Markers/Clones</a> (1) | <a href="#">Mutants/Transgenics</a> (10) | <a href="#">Expression</a> (9) | Sequence Information (0) |
| <a href="#">Anatomy</a> (1) | Gene Product (0)                         | Gene Ontology (0)                        | The Zebrafish Book (0)         | Nomenclature (0)         |
| Jobs/Meetings (0)           | <a href="#">People</a> (9)               | Other (0)                                |                                |                          |

[Gene: pax2a](#)

... Nomenclature History MUTANTS AND TARGETED KNOCKDOWNS: Mutant locus: no **isthmus** ...  
[/cgi-bin/almost/webdriver?Mlval=aa-markerview.apg&OID=ZDB-GENE-990415-8](#)

[Allele: b593 \(no isthmus\)](#)

... ZDB-FISH-011017-10 Name: no **isthmus** Abbreviation: noi b593 Previous names: AFFECTED GENE: paired box gene 2a (pax2a) has been shown to correspond to locus no **isthmus** . ( 2 ) Images ...  
[/cgi-bin/almost/webdriver?Mlval=aa-fishview.apg&OID=ZDB-FISH-011017-10](#)

## Contacting ZFIN

ZFIN is your database. We welcome your comments and suggestions. Please use the **Contact Us** on our home page or the **Your Input Welcome** button provided on every data page to contact us.