

## Instructions for Searching the Phenobank Database

### Overview

Phenobank provides access to the primary data from two high-content screens that profile the set of ~900 essential *C. elegans* genes required for embryo production and/or events during the first two embryonic divisions. In the **Sonnichsen et al.** screen, embryos individually depleted of specific gene products were filmed using differential interference contrast (DIC) microscopy between fertilization and the completion of the 2<sup>nd</sup> embryonic division. In the **Green et al.** screen, 3D fluorescence confocal microscopy was used to image the gonad of anesthetized worms expressing mCherry histone and a GFP plasma membrane marker after knockdown of individual genes.

For both screens, the set of movies for each gene knockdown were scored for the presence or absence of a set of possible **defects** (46 possible defects for the Sonnichsen embryo-filming screen and 94 possible defects for the Green gonad morphology screen). In the Sonnichsen screen, embryos that hatched were also monitored for possible post-embryonic phenotypes. In both screens, genes were placed into **phenotypic classes** based on the compilation of defects (or **phenotypic profile**) resulting from their knockdown. For the Green et al screen, phenotypic classes were organized into **broad categories** containing related phenotypic classes.

### Searching the Database

The data from the two screens can be searched based on **Phenotypic Class** or based on specific **Scored Defects** in the Green et al. and/or Sonnichsen et al. screens. Alternatively, the database can be searched based on **Gene Name**, **Genomic or Genetic Position**, or on the presence of **Protein Domains**. Searches return a list of genes matching the requested criteria. Clicking on a gene name in this list returns a page outlining the movies and phenotypic data available for that gene.

### Common Searches:

- 1. Search by Gene Name.** To obtain the phenotypic data from both screens for a gene of interest, enter either the three-letter gene name (e.g. *spd-5*) or the sequence name (e.g. F56A3.4) in the **Gene Name** window.
- 2. Search by Phenotypic Profile.** To obtain a list of the genes in a phenotypic class, choose a **Phenotypic Class** in the **Phenotypic Profile** section of the search page (*Note: for the Green et al. screen, you must first choose a Broad Category and then select a Phenotypic Class in that category from the popdown menu that appears*). Phenotypic classes are assigned based on the compilation of scored defects; therefore the genes in a phenotypic class are likely to be functionally similar.
- 3. Search by Scored Defects.** In the **Scored Defects** section of the search page you can search for *one* **individually scored defect** (e.g. Apoptosis

Reduced). A search of this will return **EVERY** gene that was annotated as having this defect. A **drawback** of using this search is that it does not take into account the complete phenotypic profile of the gene knockdown. For example, you may only be interested in genes that directly regulate apoptosis, but instead you will get some genes involved in regulating apoptotic events, but also genes whose primary function is in cell cycle regulation, gonad maturation or protein translation, etc. that may simply have an incidental effect on apoptosis.

**4. Search by Genetic, Genomic Position or Protein Domains.** In the process of trying to clone mutants, geneticists may be interested in obtaining the phenotypic profiles for all of the genes in a particular chromosomal region. Similarly, there are cases in which it may be useful to obtain a list of all of the genes in either screen that contain a particular protein domain.

**5. Combination Searches.** Choosing multiple features will return the list of genes for which ***all of the selected criteria are met***. For example, you can search for all of the genes in phenotypic class that are in a specific chromosomal region.

**6. Compiling Multiple Searches.** After a search is completed, you can click on the “add additional results” link in the top bar to append the results of an additional search to the current list.