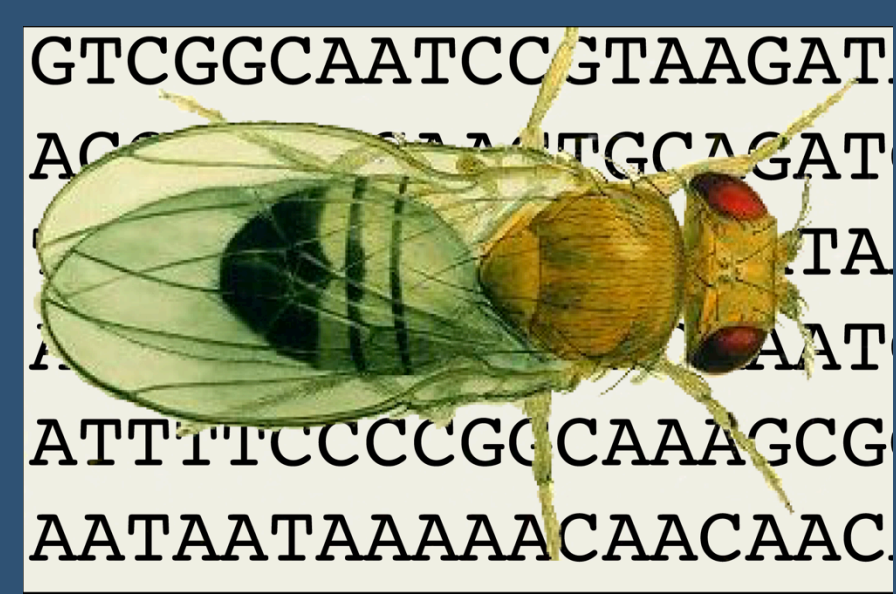


GTCGGCAATCC STAAGAT
 ACCGATGTCGAT
 TATTA
 AATTTCCCGCCAAAGCG
 AATAATAAAAAACAACA



Finding GAL4 drivers and other transgenic tools in FlyBase

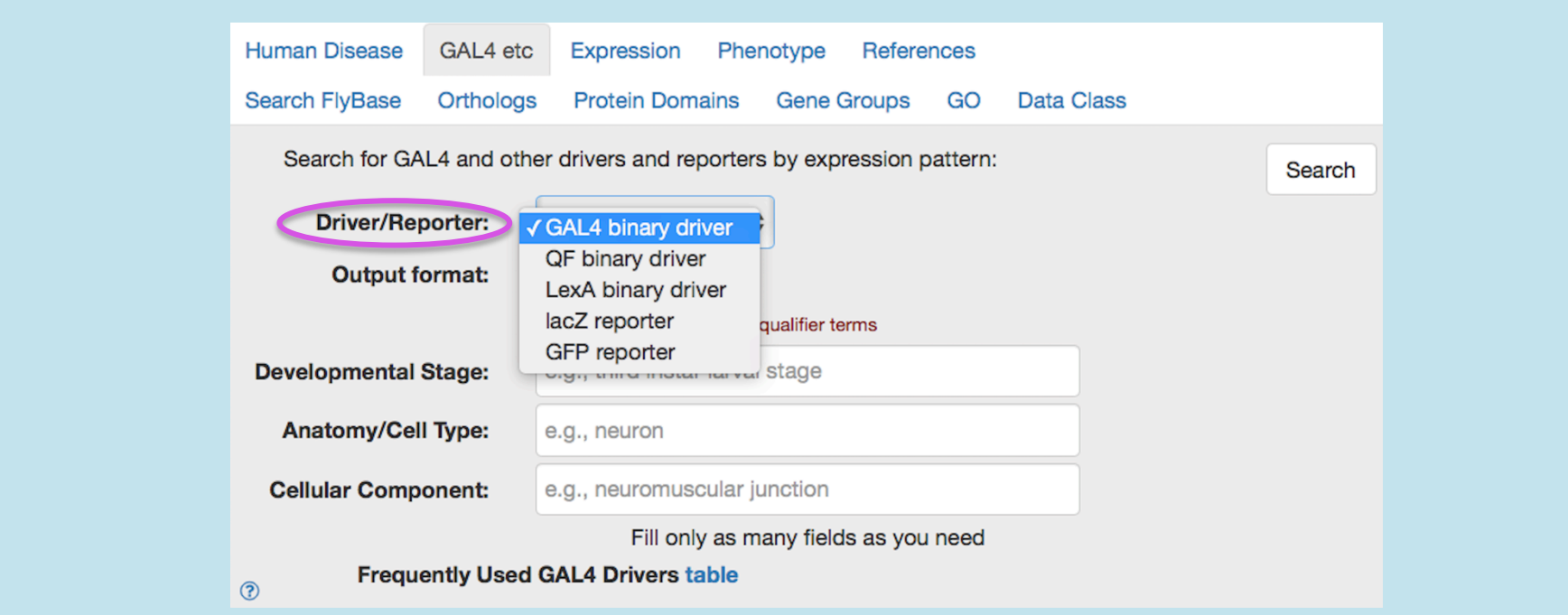
816

Sian Gramates, Gillian Millburn, Josh Goodman, Kathleen Falls, Victor Strelets, Jim Thurmond, Victoria Jenkins, David Emmert, and the FlyBase Consortium

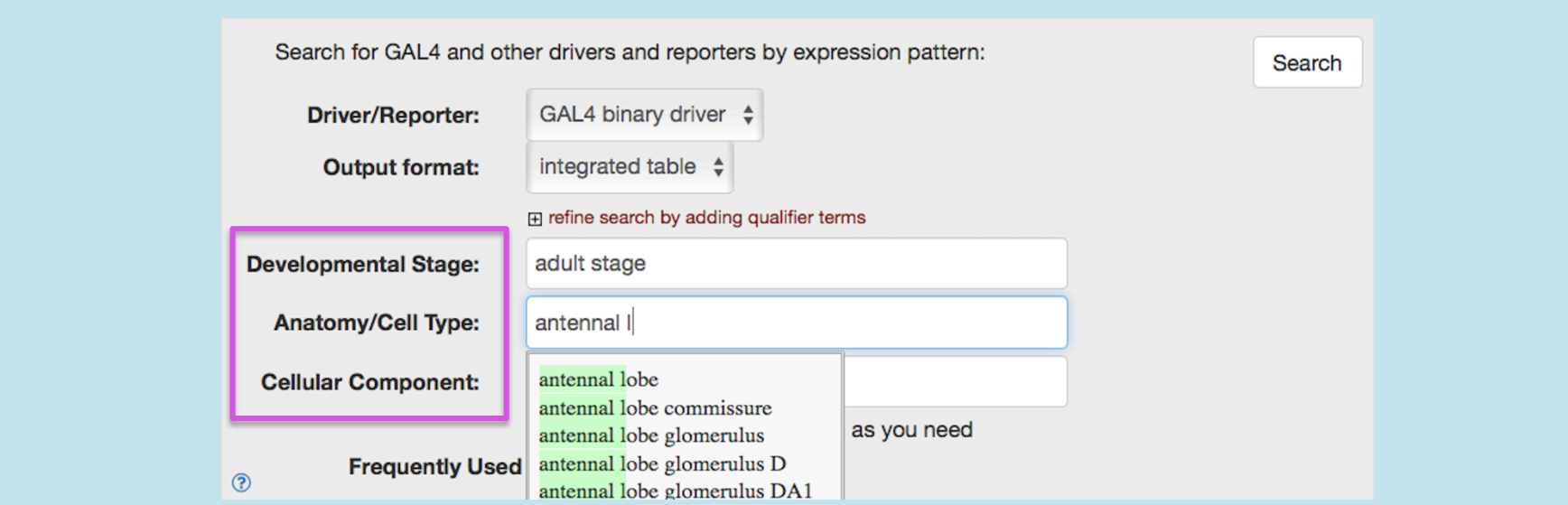
The rich genetic toolkit that is available for *Drosophila melanogaster* helps to make it an ideal model organism to answer a wide range of biological questions, but also creates a potential problem - how to find the most appropriate fly line for a particular experiment. FlyBase has introduced a number of improvements to help address this question. These include the 'GAL4 etc' QuickSearch tab which allows searches for GAL4 and other binary drivers and non-binary reporters by temporal-spatial expression pattern, and dedicated 'Experimental Tool' reports for commonly used tools such as GAL4 and EGFP, which gather information on related transgenic constructs in a single webpage. Together with enhancements to hit lists, a specialized Integrated Table view hit list, and the 'Frequently Used GAL4 Driver' table, this has improved the access of these important transgenic tools to FlyBase users.

The GAL4 etc QuickSearch tab

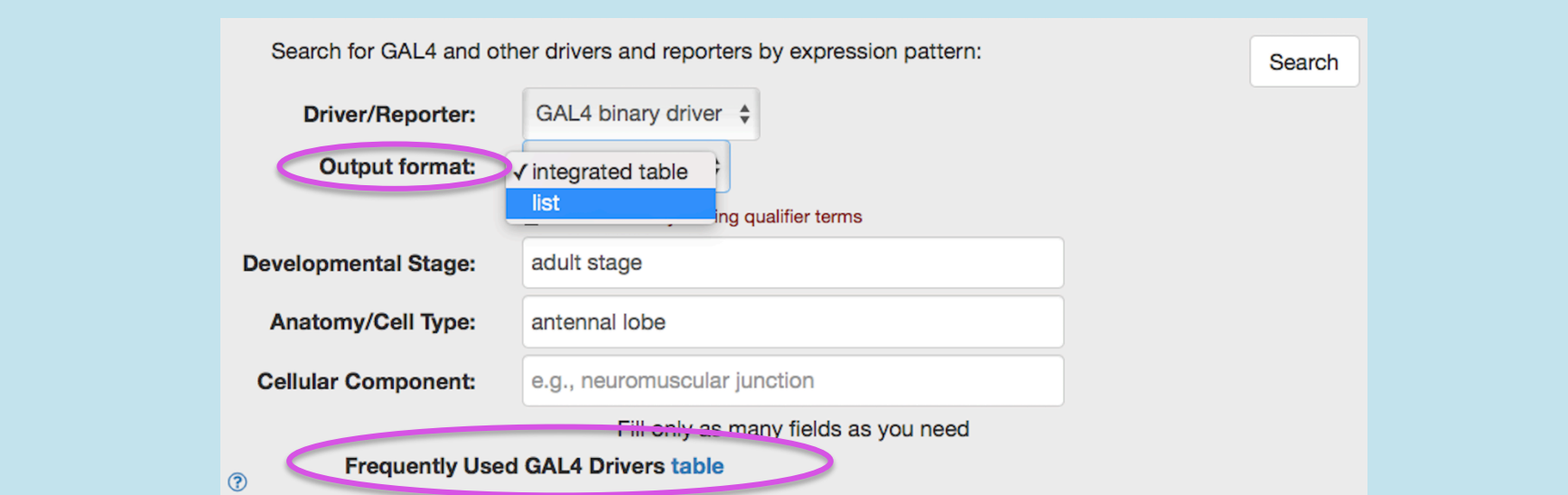
The GAL4 etc tab uses the same strategies as the Expression tab, and similarly searches expression statements curated from the literature.



The Driver/Reporter menu currently supports five options: GAL4, QF, and LexA binary drivers, and lacZ and GFP reporters. You can search for one type of driver or reporter at a time. We will be updating this menu soon, to incorporate a Tools-based selection, as well as an option to search for an expression pattern reflecting that of a specific gene.

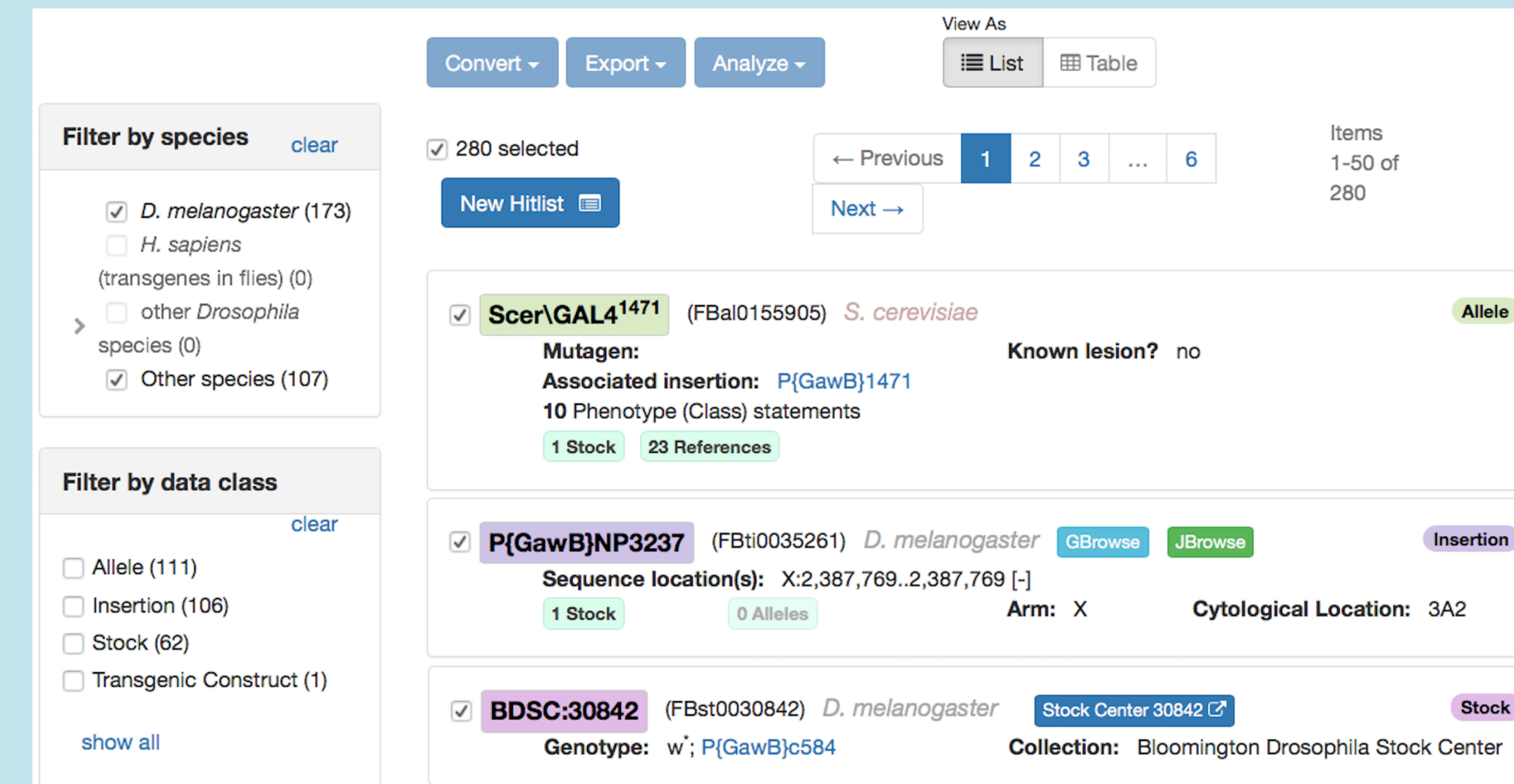


Expression pattern searches use FlyBase stage and anatomy controlled vocabulary (CV) terms, and feature coordinated autocomplete. Terms are suggested as you type, and are constrained by other boxes. You can change the stringency of search by using a broader or more specific term, or by not filling all boxes.



The GAL4 etc tab has two output formats. The List format displays search results in a standard FlyBase 2.0 faceted hit-list consisting of alleles, insertions, transgenic constructs, and stocks. The Integrated Table format displays results in a customized table that highlights the relationships between these data types. The tab also includes a link to the Frequently Used GAL4 Drivers table.

The List view of the GAL4 etc hit-list



The List view hit-list includes four data types: alleles, insertions, transgenic constructs, and stocks. Filtering the hit-list to a single data type allows you to further convert the results to another data type, export to a file or to another FlyBase tool, or analyze the results in a data type specific manner. The filtered list can also be viewed as a standard hit-list table; please note that this is not the same as the Integrated Table described below.

The Integrated Table view of the GAL4 etc hit-list

Query: GAL4 | adult stage | antennal lobe

Group #	Relevant Expression Statements	Allele	Construct	Insertion	Stock
1	antennal lobe glomerulus DM6 antennal lobe glomerulus DL3 adult stage	td[gal4]	P[GawB]	P[GawB]td[gal4]	FBst0006313 FBst0006314
2	antennal lobe glomerulus adult antennal lobe adult antennal lobe glomerulus adult stage	Scer[GAL4]SG18.1	P[GawB]	P[GawB]SG18.1	FBst0006405 FBst0307412
3	antennal lobe glomerulus DL1 adult stage	Scer[GAL4]NP3529	P[GawB]	P[GawB]NP3529	FBst0316058
4	adult antennal lobe adult stage	Scer[GAL4]H24	P[GawB]	P[GawB]H24	FBst0051632

The Integrated Table view is designed to display the relationships between alleles, insertions, transgenic constructs, and stocks. For example, the allele Scer[GAL4]^{H24} is caused by a specific insertion, P[GawB]H24, of the enhancer trap construct P[GawB], and has one stock. Hits that are associated with stocks available from a public stock center are automatically pre-sorted to the top of the table. The search used to generate the hit-list is displayed at the top.

Each entry in the table includes the controlled vocabulary terms that resulted in that hit. These terms may not be the exact CV terms used in search; the term may have a part_of or is_a relationship to the search term; for example, 'antennal lobe glomerulus DL1' has a part_of relationship to 'antennal lobe', while 'adult antennal lobe' has an is_a relationship to 'antennal lobe'.

Please note that the listed CV terms do not describe the full curated expression pattern. The full expression pattern is displayed in the Expression section of allele, insertion, and transgenic construct reports.

GAL4 drivers that appear on the Frequently Used GAL4 Driver table are indicated with a green check mark.

The Frequently Used GAL4 Drivers table

In the Frequently Used GAL4 Drivers table, we have compiled information more than 200 GAL4 drivers, including the 150 stocks most ordered from the Bloomington Drosophila Stock Center and those drivers that have been curated to more than 20 research publications. This table can be accessed via a link on the GAL4 etc QuickSearch tab, and is also available as a downloadable TSV file. The table can be sorted by column for most columns. Links to publications and stocks are included in this table.

The first two columns list the GAL4 drivers by allele, and by insertion or transgenic construct. We include allele designations to draw attention to relationships between the more user-familiar insertion/construct symbols and their associated alleles. FlyBase uses allele symbols in many contexts, including in text descriptions of expression patterns, phenotypes, and genetic interactions.

We display expression pattern information in several formats: FlyBase Anatomy CV terms, common terms often used in literature, short text descriptions, major developmental stage, and genes for those drivers that reflect a gene expression pattern. Term columns are can be sorted, so drivers with similar expression patterns can be more easily compared.

The expression data has been condensed to emphasize how these drivers are used as experimental tools. Full curated expression patterns can be found on linked allele, insertion or construct reports.

Please note: This table does not describe the entire expression pattern of each GAL4 driver. You can find the complete curated pattern on the allele, insertion or construct report of each driver.

Do you have a contribution that could help FlyBase to improve this list? Please contact FlyBase if you have comments about the expression pattern of one of these drivers, know of a driver that should be added, or if you would like to contribute a representative expression pattern image.

Allele	Insertions / Constructs	Image	Assoc. gene	Common terms	Major tissue	Major stage	Description	# Stocks	# Refs
Scer[GAL4] ^{trm}	P[ase-GAL4]		ase		type I neuroblast	larval stage	Drives expression in type I, but not type II, neuroblasts.	0	22
Scer[GAL4] ^{c309}	P[GawB]c309				mushroom body	larval stage adult stage	Drives expression in the alpha, beta, alpha', beta', and gamma lobes of the mushroom body.	1	46
Scer[GAL4] ^{tr7}	P[GawB]tr7				body wall muscle	larval stage	Drives expression in the larval body wall muscles.	2	98

New Features of the Frequently Used GAL4 Drivers table

In an upcoming release, we will be enhancing the Frequently Used GAL4 Drivers table with representative images illustrating the expression patterns of the drivers, starting with published images from papers distributed using the Creative Commons Attribution License, or for which we have obtained permission to use.

There are many GAL4 drivers for which we have been unable to find a suitable image to incorporate into the table. We are seeking high-quality unpublished GAL4 images from the FlyBase user community; every image we use will be credited to the person and/or research group that provided it.

We have added a dedicated Contact FlyBase link to the Frequently Used GAL4 Drivers table. This link allows FlyBase users to directly contact the curators responsible for the maintenance of this resource. Please contact us if you have a comment on a driver's displayed expression pattern, if you'd to contribute an image, if you think a GAL4 driver should be added to the table, or if you have a suggestion to make this resource more useful.

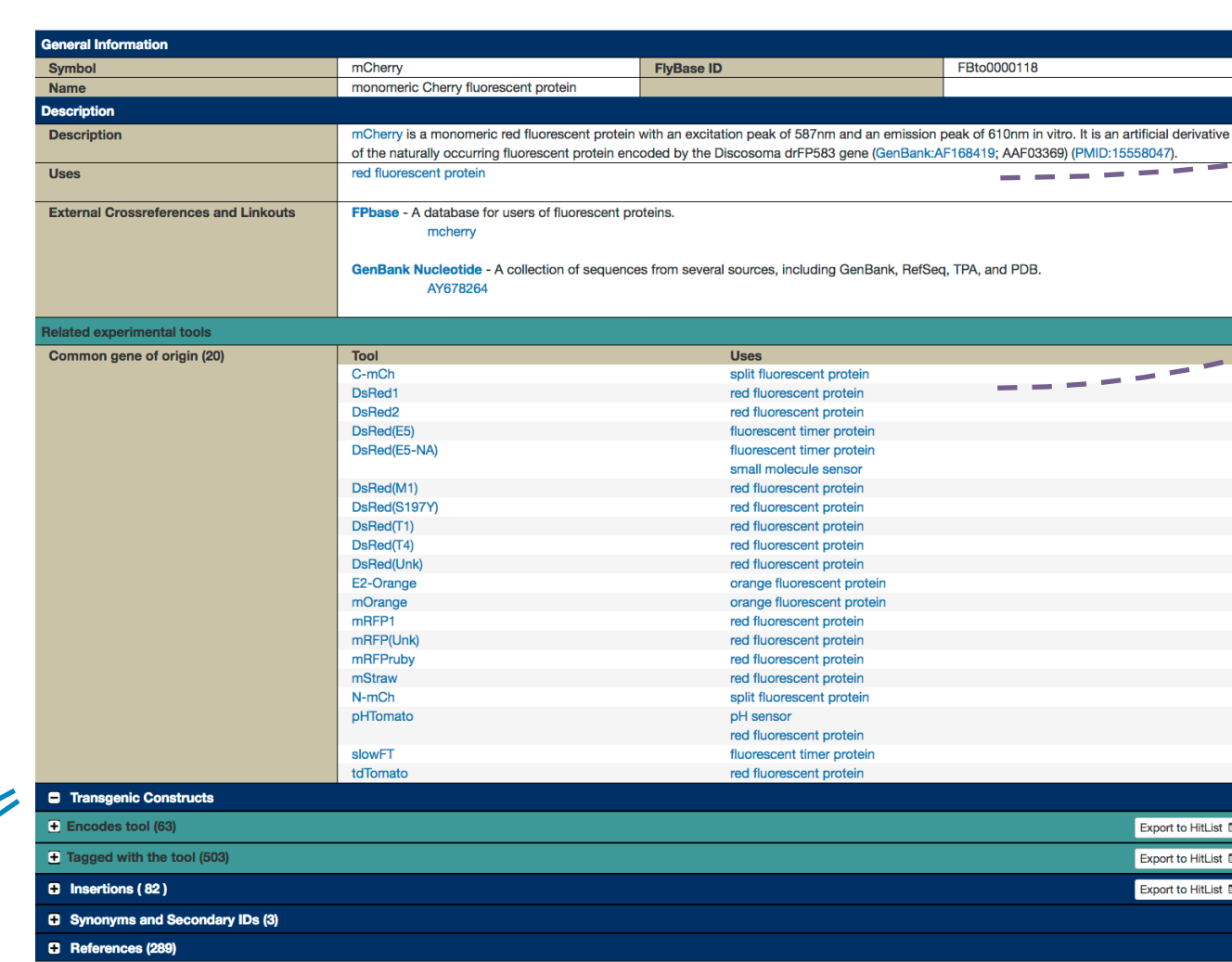
Experimental Tool Report

Uses term(s) describe what the tool is used for.

- Click on the term to go the Uses Term Report

Related experimental tools section makes it easy to jump to reports for related tools at a finer level of detail than the "Uses" section.

- Click on the Tool name to go to its Tool Report
- Click on the Uses to go to the corresponding Term Report



Columns list the components that make up the transgenic construct

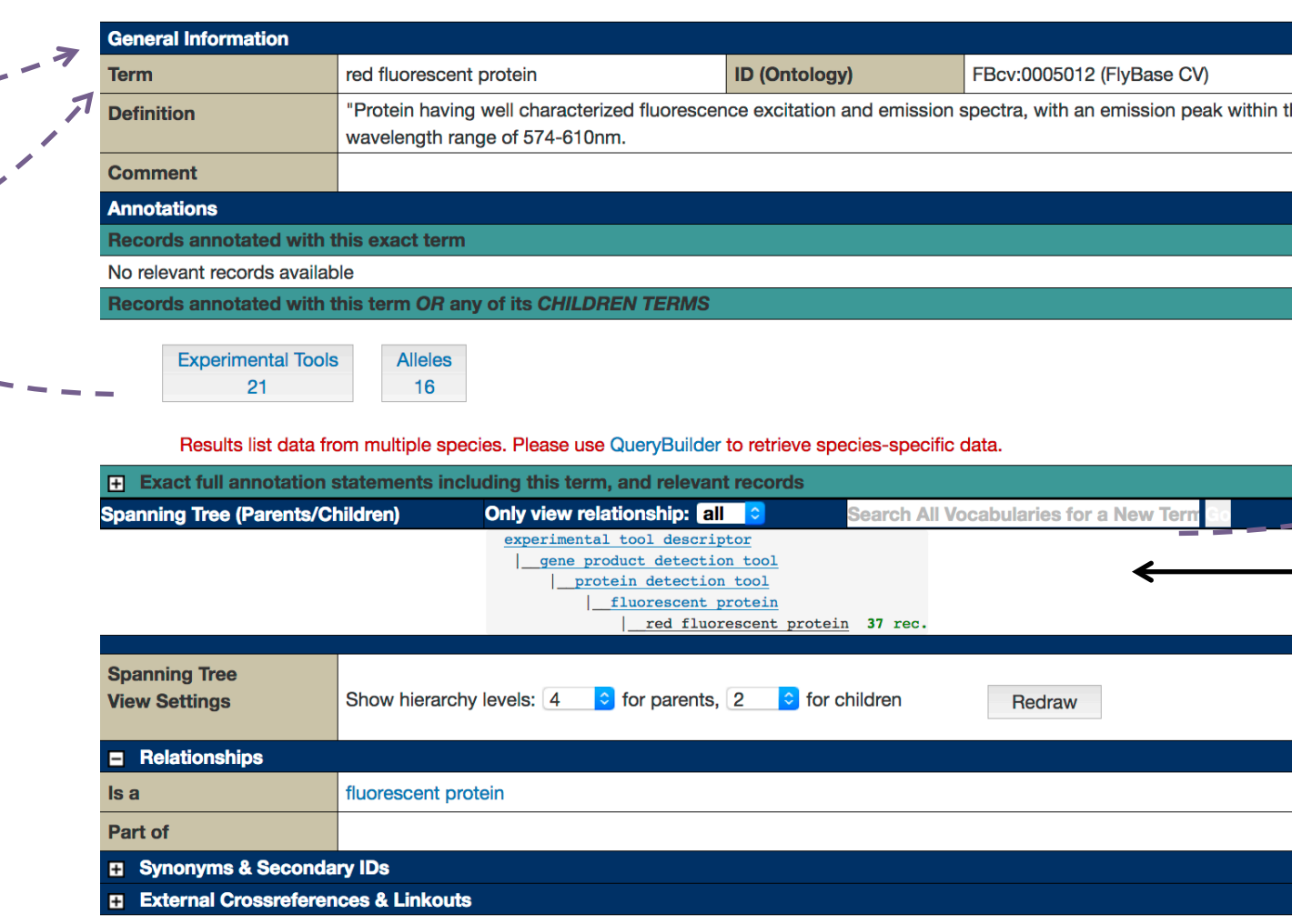
Link to relevant Gene (e.g. sqh) or Tool (e.g. UAS) report

Columns list Tool (e.g. mCherry) and its Uses (e.g. red fluorescent protein) for the main encoded product and any tags present

Link to stocks

Transgenic construct(s)	Component allele	Reg. region	Encoded product / Tool Uses	Tagged with	Also carries	Stocks
P[ChFP]	Disc[GFPPmCherry]sqh	sqh	mCherry red fluorescent protein	Tag:NLS(Unk)		4
P[UAS-mCherry-NLS]	Disc[GFPPmCherry]UAS Tag:NLS(Unk)	UAS	mCherry red fluorescent protein	Tag:NLS(Unk) nuclear protein localization tag		4
P[UAS-mCherry-CAAX]	Disc[GFPPmCherry]UAS cba Tag:Myo2-4B	UAS	mCherry red fluorescent protein	Tag:MPtra54B membrane protein localization tag		3
P[10XQUAS-6XmCherry-HA] PBac[10XQUAS-6XmCherry-HA]	Disc[GFPPmCherry]10XQUAS Tag:HA	QUAS	mCherry red fluorescent protein	Tag:HA epitope tag		2

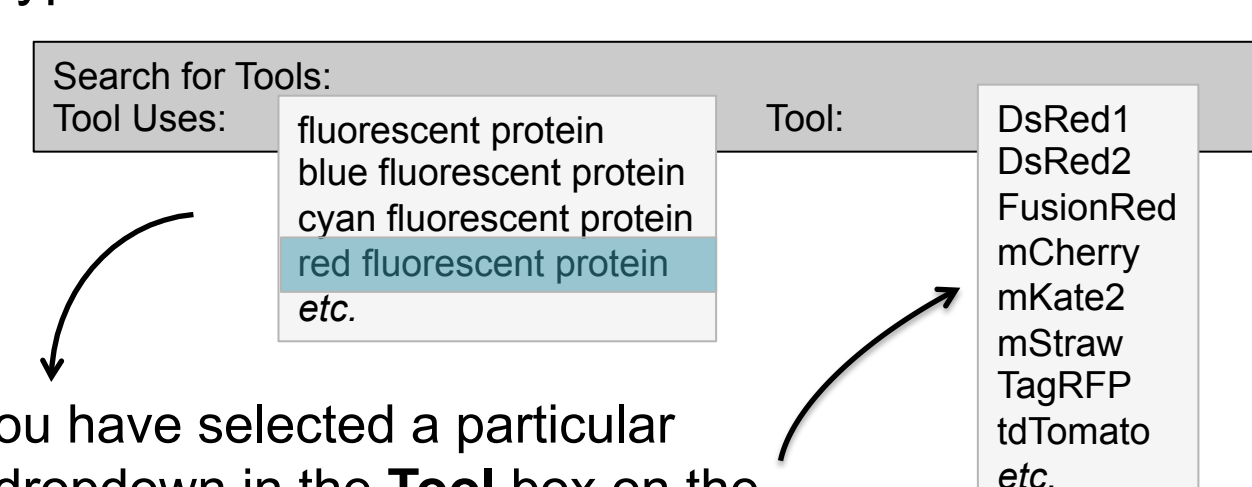
'Experimental Tool Uses' Term Report



Searching

- Search by name (e.g. GAL4, mCherry) via QuickSearch
- Search by Uses using the Vocabularies tool

Coming soon! QuickSearch GAL4 tab will be expanded to include all types of tools:



Once you have selected a particular Use, a dropdown in the Tool box on the right will show all the corresponding tools.

Alternatively, search directly for a Tool by typing the name into the Tool box.

Main branches of Uses tree and examples of Tools

