

Mapping Plant Metabolic Pathways using PathVisio 2

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Objective:

The purpose of this presentation is to show the source, methods, and results of creating a computerized display of the metabolic pathways of model plants *Oryza sativa* (rice) and *Arabidopsis thaliana* (thale cress) using the computer program PathVisio2. The finished products may be viewed and modified for free on www.wikipathways.org by the registered community annotators.

Introduction:

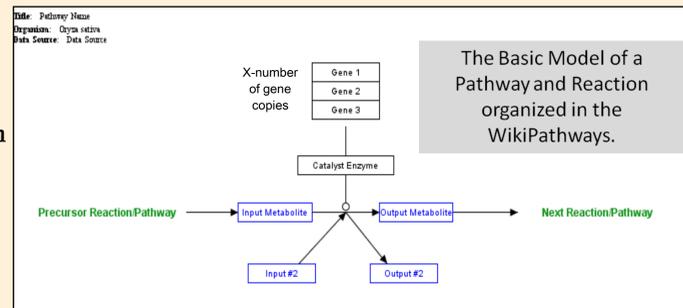
Many species, as part of their evolutionary history and adaptation to the environment, generally have (1) set of common core metabolic pathways and (2) pathways unique to them. Often times common core metabolic pathways and reactions, though carried out by the same enzymatic activities, vary in species-specific manner with respect to the input small-molecules (e.g. metabolites) and the number of genes encoding for the proteins bearing the enzymatic activity. In the new digital age this knowledge is difficult to preserve and continuously update in a text-book style format. Therefore, we decided to create a catalog of metabolic pathways of model plants rice and Arabidopsis using the computer program PathVisio2.

Some highlights of this resource are:

- Provides invaluable teaching and presentation aids
- Has value in managing and visualizing large experimental data sets to generate testable hypotheses when combined with software tools.
- Compared to the Kyoto Encyclopedia of Genes and Genomes (KEGG) which provides the most popular reference pathway database but is not accessible to the community for making edits on species specific reactions, using PathVisio2 and Wiki-Pathways users can draw their own pathways and edit existing ones based on experimental evidence.
- The online resource allows comparative analysis of pathways from different species including plants and contributes to genome annotation.
- The finished products may be viewed and modified on www.wikipathways.org by the community of registered annotators.
- The resource is accessible online for free.

Methods:

In PathVisio2, the metabolic pathways are organized as flowcharts of biochemical reactions. To create a flowchart for a pathway, one begins with one or more input-substrates and ends with one or many output-products. The reactions may be catalyzed by enzymes if it is a metabolic reaction. Other types of reactions may include transport, signal transduction and regulation.



Results:

Curated pathways of rice and Arabidopsis can help in comparative analysis and finding novel genes.

www.wikipathways.org

Abscisic Acid Biosynthesis (Arabidopsis thaliana)

Thomas Kelder, Kristina Hanspers, Philip Zimmermann

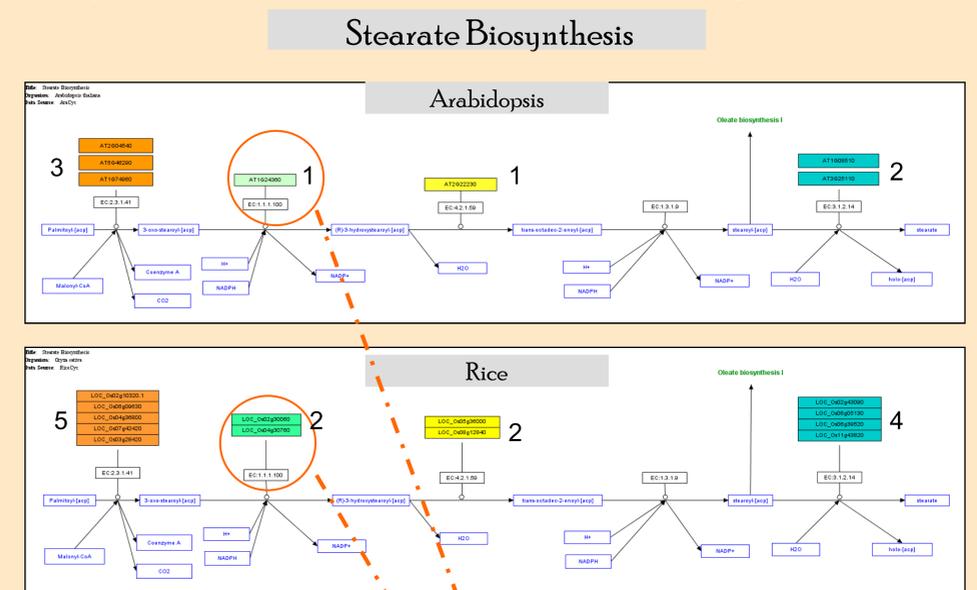
Register and Login for making edits. Free for everyone.

Download options

Data Sources:

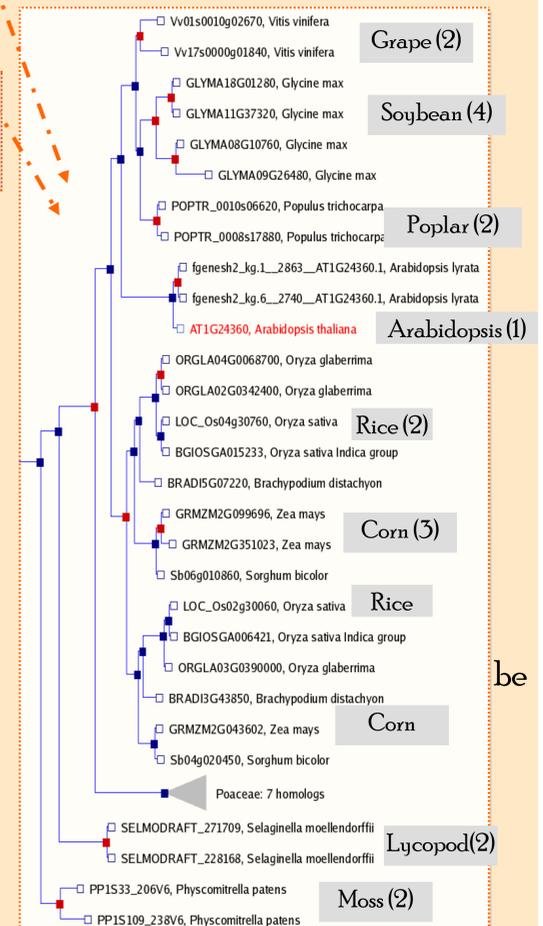
RiceCyc v3.2 (hosted by the Gramene project) <http://pathway.gramene.org> and AraCyc v8.0 (provided by TAIR) <http://www.arabidopsis.org>

Comparison of Rice and Arabidopsis pathways



Example: Phylogenetic tree of genes annotated to EC:1.1.1.100 3-oxoacyl-[acyl-carrier-protein] reductase

Links to the Source Gramene database and the genomes can suggest novel genes using the phylogenetic analysis. This way users can find the genes of interest and their copy numbers (shown in brackets on the adjoining image) in the species of their interest.



Conclusions:

- Once the pathways have been completed and uploaded, it may be viewed online.
- The online version of these computerized pathways may be viewed and modified until they are ready to be published.

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