Gene Ontology™ (GO) Consortium

http://www.geneontology.org/

The problem:

- Vast amounts of biological data held in genome and protein databases.

- Different names for the same concepts in different species.

- Makes cross-species comparison difficult.

Ontology (for our purposes)

- "an explicit specification of some topic" –
  Stanford Knowledge Systems Lab

- Includes:
  - a vocabulary of terms (names)
  - defined logical relationships to each

What GO is <u>not</u>:

- Not a way of unifying databases!

- Not a dictated standard

- Additional ontologies needed to model biology and experimentation.
  http://obo.sourceforge.net/

The Three Ontologies

- *Molecular Function*: elemental activity or task

- *Biological Process*: broad objective or goal

- *Cellular Component*: location or complex

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- *Biological Process*: broad objective or goal
  mitosis, signal transduction, metabolism

- *Cellular Component*: location or complex
  nucleus, ribosome
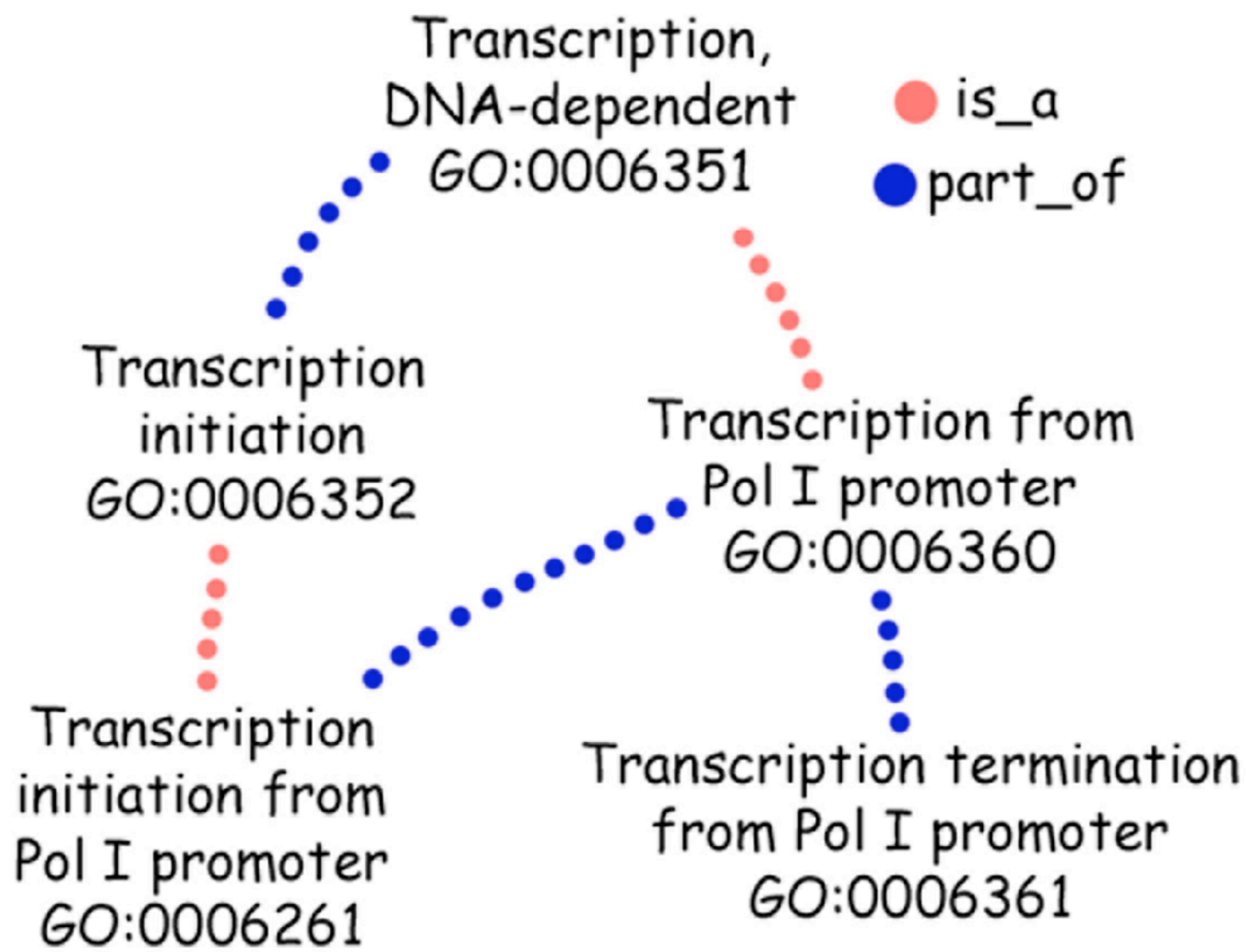
What's in a GO term?

term: transcription initiation

id: GO:0006352

definition: Processes involved in starting transcription, which is the synthesis of RNA by RNA polymerases using a DNA template.

More examples:

GO:0009838 ; abscission
GO:0007568 ; aging
GO:0030154 ; cell differentiation
GO:0007349 ; cellularization
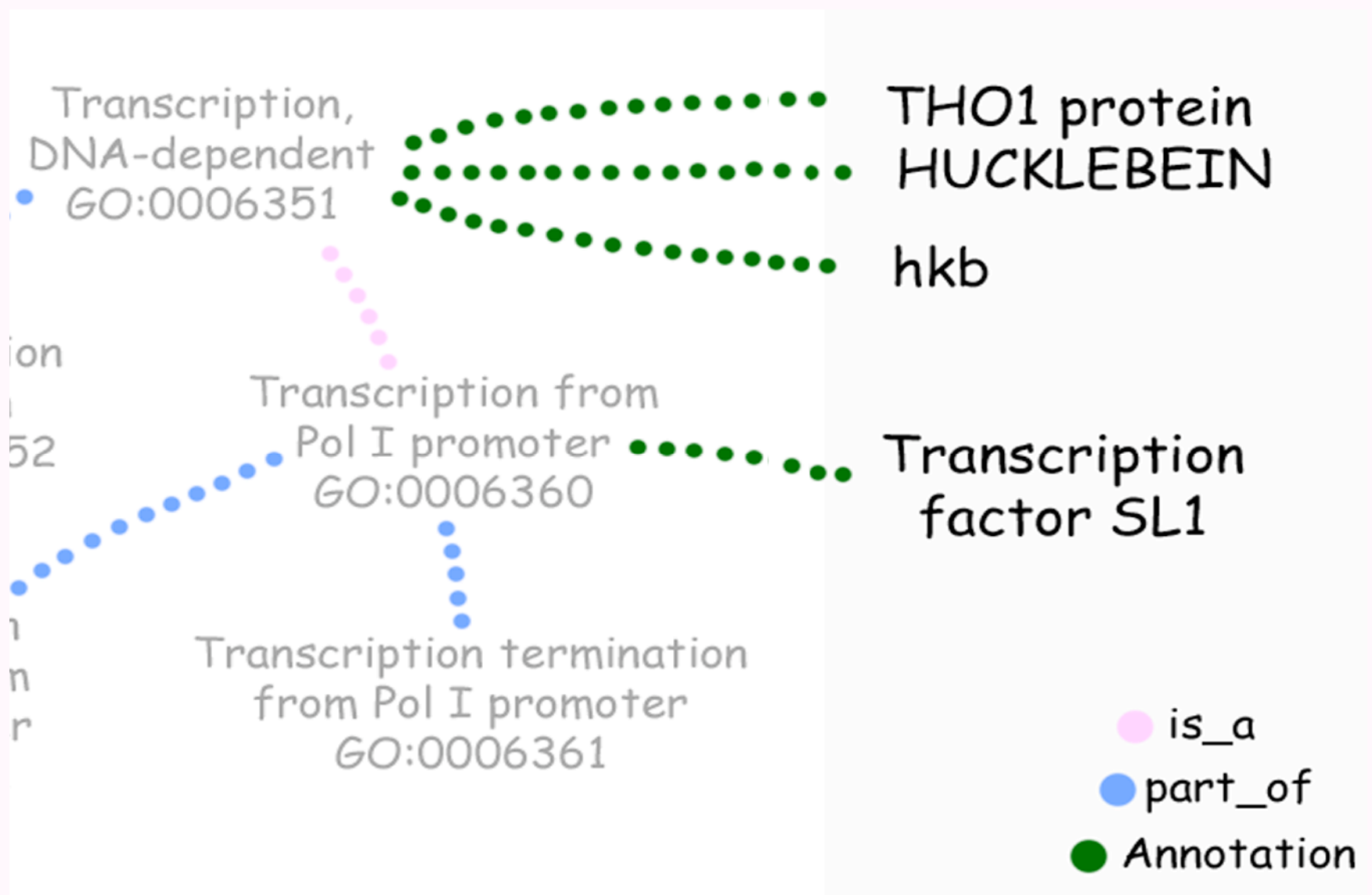GO:0009790 ; embryonic development
GO:0009292 ; genetic transfer
GO:0040007 ; growth
GO:0007320 ; insemination
GO:0002164 ; larval development
GO:0010073 ; meristem maintenance
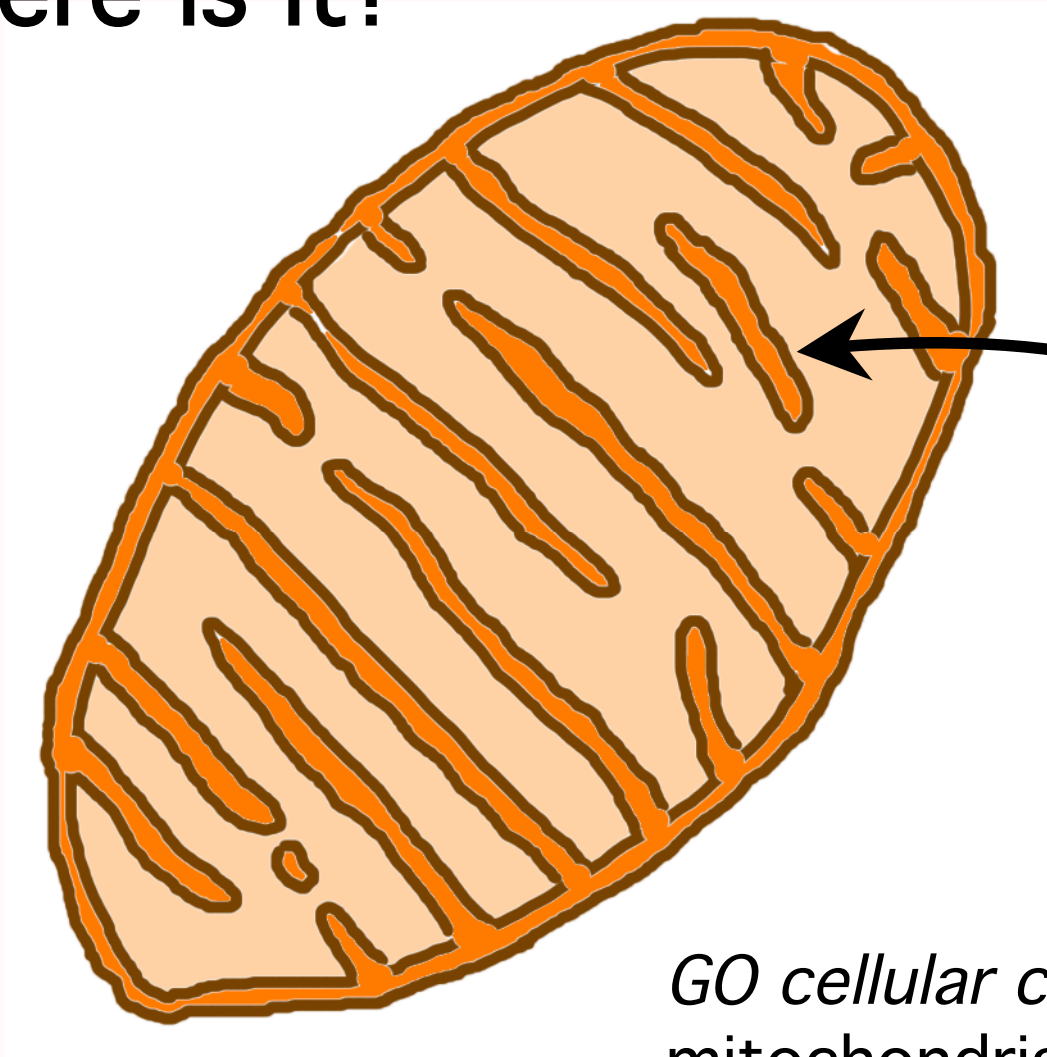GO:0009933 ; meristem organization

Annotation

Mitochondrial P450
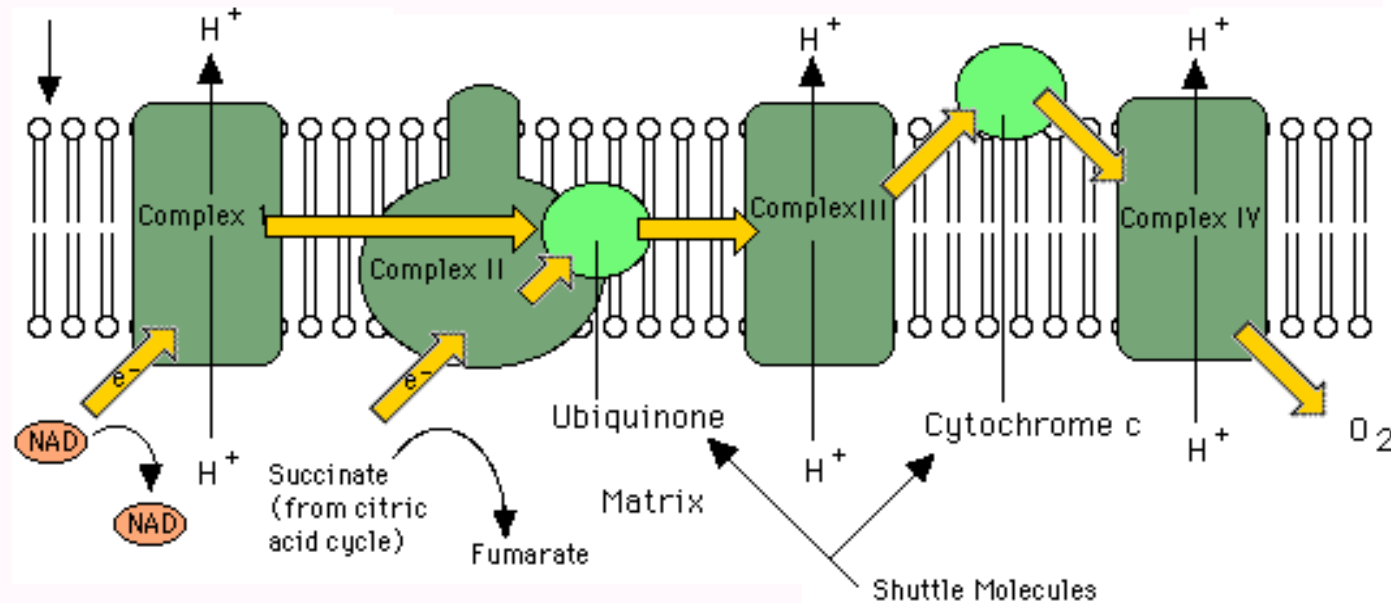(CC24 PRO1238; MITP450CC24)

Where is it?

Mitochondrial p450

GO cellular component term: mitochondrial inner membrane ; GO:0005743

What does it do?

$$\text{substrate} + O_2 = CO_2 + H_2O \ \text{product}$$

GO molecular function term:
monooxygenase activity ; GO:0004497

Which process is this?

GO biological process term:
electron transport ; GO:0006118

http://ntri.tamuk.edu/cell/mitochondrion/krebpic.html

monooxygenase activity ; GO:0004497

Other gene products:

MGI	monooxygenase, DBH-like 1
MGI	prostaglandin I2 (prostacyclin) synthase
MGI	splicing factor 3b, subunit 2
SGD	flavin-containing monooxygenase
TAIR	FERULATE-5-HYDROXYLASE 1

Project: Gene Ontology: Browse Curator requests

Submit New | Browse | Reporting | Admin

Assignee: **(?)**　　　Status: **(?)**　　　Category: **(?)**　　　Group: **(?)**

| Unassigned ⬍ | | Open ⬍ | | Any ⬍ | | Any ⬍ |

Sort By: **(?)** | Open Date ⬍ | Descending ⬍ | | Browse |

Browse the term requests currently under consideration.

Request ID	Summary	Date	Assigned To	Submitted By
☐ 828534	transletion synthesis	2003-10-22 22:03	nobody	smundodi
☐ 828437	GO:0005579 Membrane Attack Complex Needs New Definition	2003-10-22 19:15	nobody	aledie
☐ 828236	regulation of F-actin localization	2003-10-22 14:23	nobody	ecamon
☐ 828219	EASY: gamma tubulin binding	2003-10-22 13:38	nobody	ecamon
☐ 828196	cilia vs flagellum	2003-10-22 13:04	nobody	beckyfoulger
☐ 824845	GO:0009986 : cell surface /extracellular	2003-10-16 14:05	nobody	val_wood
☐ 824121	Mitogen-activated protein kinase p38 binding	2003-10-15 13:51	nobody	ecamon
☐ 824110	osmoregulation	2003-10-15 13:28	nobody	val_wood
☐ 823132	Proposed reorganization of some morphogenesis terms	2003-10-14 00:31	nobody	emsch
☐ 822821	TPV ? recombinational repair and children	2003-10-13 15:39	nobody	val_wood
☐ 822657	M phase of mieotic cell cycle	2003-10-13 10:35	nobody	val_wood
☐ 822629	homologous chromosome pairing at meiosis	2003-10-13 10:08	nobody	val_wood
☐ 822620	various chromosome segregation/ sister chromatid separation	2003-10-13 10:02	nobody	val_wood
☐ 821166	apoB mRNA editing enzyme complex	2003-10-10 12:18	nobody	ecamon
☐ 820588	possible term merge, signal sequence receptor complex	2003-10-09 12:21	nobody	val_wood
☐ 820575	complexes to move below cytoplasm?	2003-10-09 12:01	nobody	val_wood
☐ 820517	Cdc73/Paf1 complex incorrect parentage?	2003-10-09 09:54	nobody	val_wood
☐ 819849	EASY:Binding terms	2003-10-08 09:34	nobody	ecamon

GOst Search
Get this GO term as RDF XML.
Get this data as a GO flat file.

cellulose microfibril

Accession: GO:0009549
Synonyms: None.
Definition:

Cellulose is a straight chain polysaccharide composed of B(14) linked glucose subunits. It is a major component of plant cell walls where it is found as microfibrils laid down in orthogonal layers. Higher plant microfibrils are about 10nm in diameter and extremely long in relation to their width. The cellulose molecules are oriented parallel to the long axis of the microfibril in a paracrystalline array, which provides great tensile strength. The microfibrils are held in place by the wall matrix and their orientation is closely controlled by the protoplast.

☐ Term Lineage   **Graph view.**

GO:0003673 : Gene_Ontology (103367)
  ⊕ GO:0005575 : cellular_component (54946)
    ① GO:0005623 : cell (44343)
      ⊕ GO:0030312 : external encapsulating structure (317)
        ① GO:0005618 : cell wall (238)
          ① GO:0009505 : cell wall (sensu Magnoliophyta) (58)
            ① GO:0009530 : primary cell wall (1)
              ⊕ **GO:0009549 : cellulose microfibril (0)**
            ① GO:0009531 : secondary cell wall (0)
              ⊕ **GO:0009549 : cellulose microfibril (0)**
        ① GO:0048196 : extracellular matrix (sensu Magnoliophyta) (3)
          ① GO:0009530 : primary cell wall (1)
            ⊕ **GO:0009549 : cellulose microfibril (0)**
          ① GO:0009531 : secondary cell wall (0)
            ⊕ **GO:0009549 : cellulose microfibril (0)**
      ① GO:0005576 : extracellular (4357)
        ⊕ GO:0005578 : extracellular matrix (605)
          ① GO:0048196 : extracellular matrix (sensu Magnoliophyta) (3)
            ① GO:0009530 : primary cell wall (1)
              ⊕ **GO:0009549 : cellulose microfibril (0)**
            ① GO:0009531 : secondary cell wall (0)
              ⊕ **GO:0009549 : cellulose microfibril (0)**

http://godatabase.org/cgi-bin/go.cgi

mappings

Database	Index File
Swiss-Prot	spkw2go
Enzyme Commission	ec2go
EGAD	egad2go
GenProtEC	genprotec2go
TIGR role	tigr2go
TIGR Families	tigrfams2go
InterPro	interpro2go
MIPS Funcat	mips2go
MetaCyc Pathways	metacyc2go
MultiFun Classifications	multifun2go
Pfam Domains	pfam2go
Prodom Domains	prodom2go
Prints Domains	prints2go
ProSite Domains	prosite2go
Smart Domains	smart2go

```
EC:1.1.1.1 > GO:alcohol dehydrogenase activity ; GO:0004022
EC:1.1.1.10 > GO:L-xylulose reductase activity ; GO:0050038
EC:1.1.1.104 > GO:4-oxoproline reductase activity ; GO:0016617
EC:1.1.1.105 > GO:retinol dehydrogenase activity ; GO:0004745
```

Contributors

FlyBase
DictyBase
GeneDB S. pombe
Mouse Genome Database
Genome Knowledge Base
TIGR Gramene
The Arabidopsis Information Resource
The Zebrafish Information Network
Berkeley Drosophila Genome Project
Saccharomyces Genome Database
The Institute for Genomic Research

Rat Genome Database
WormBase
Compugen
GeneDB for protozoa
EBI GOA project