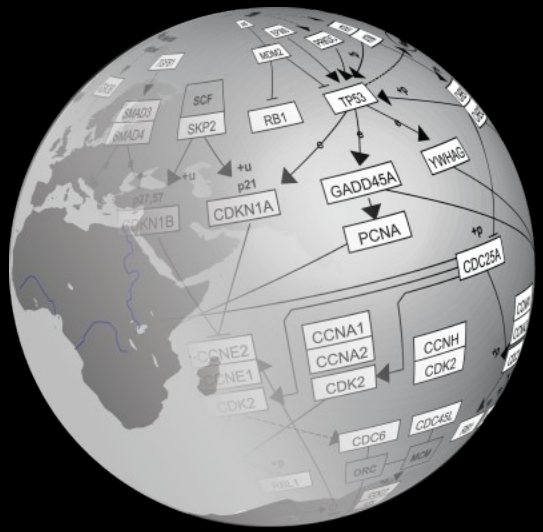
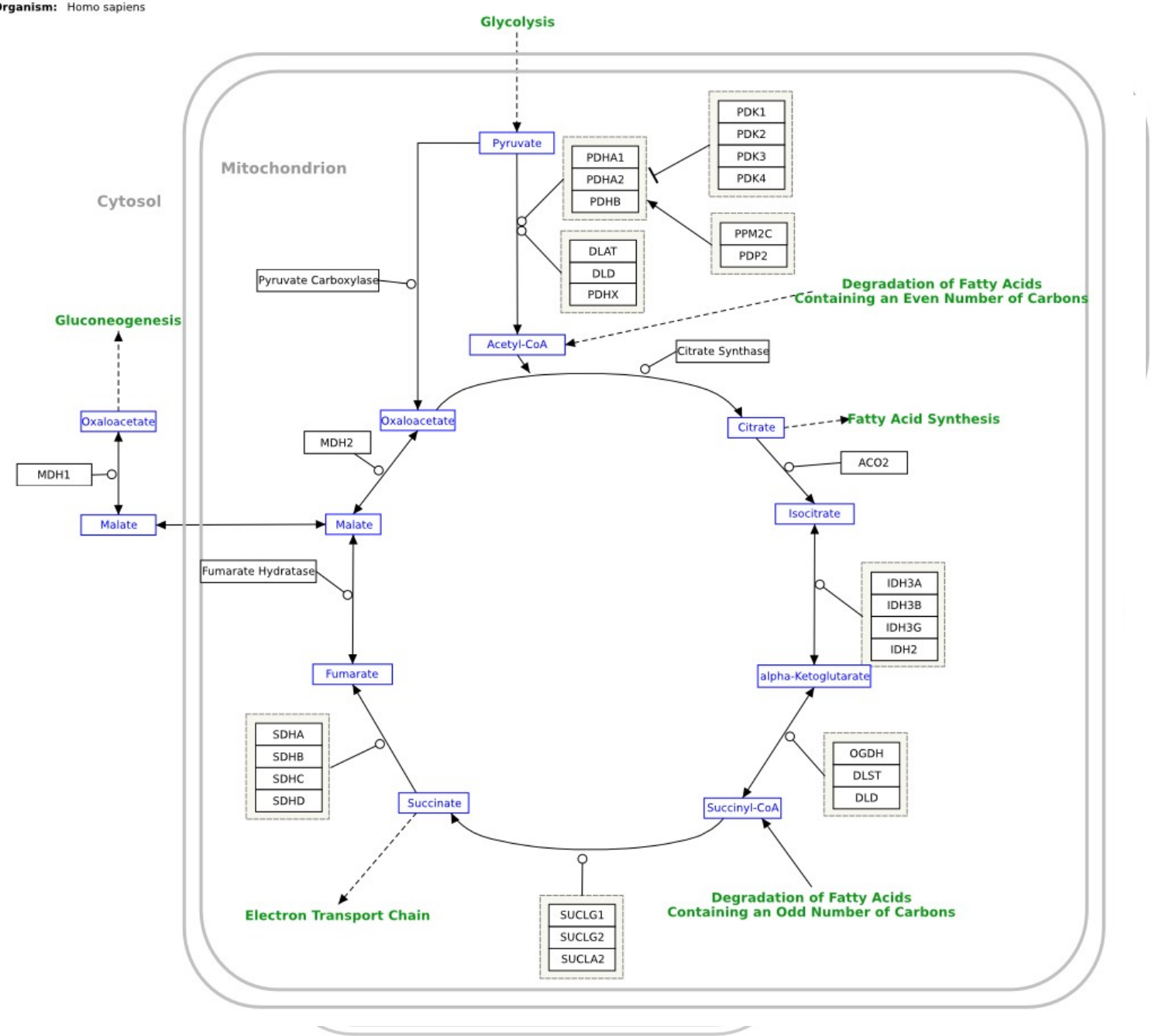
WikiPathways
Community Curation of Biological Pathways

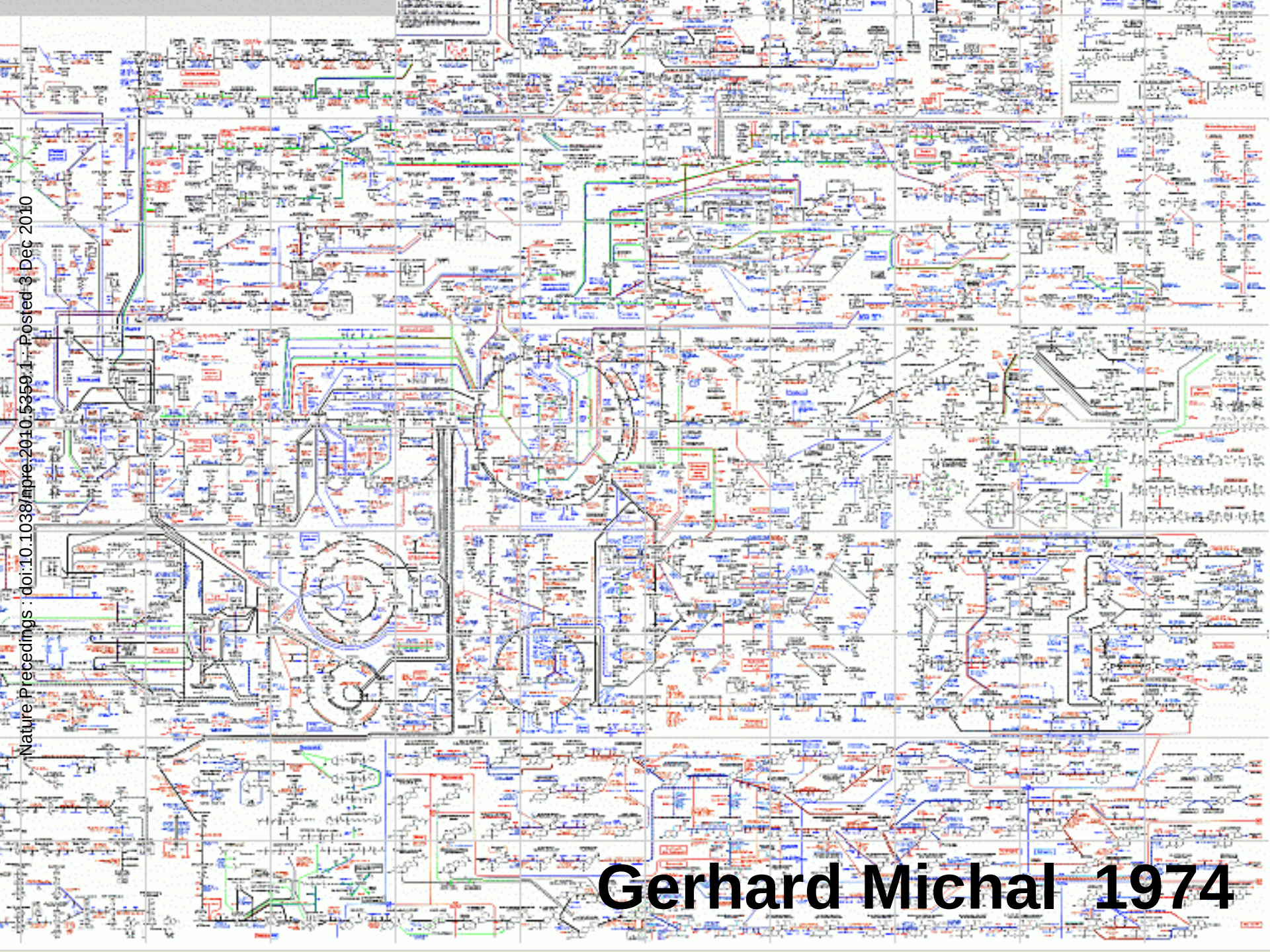


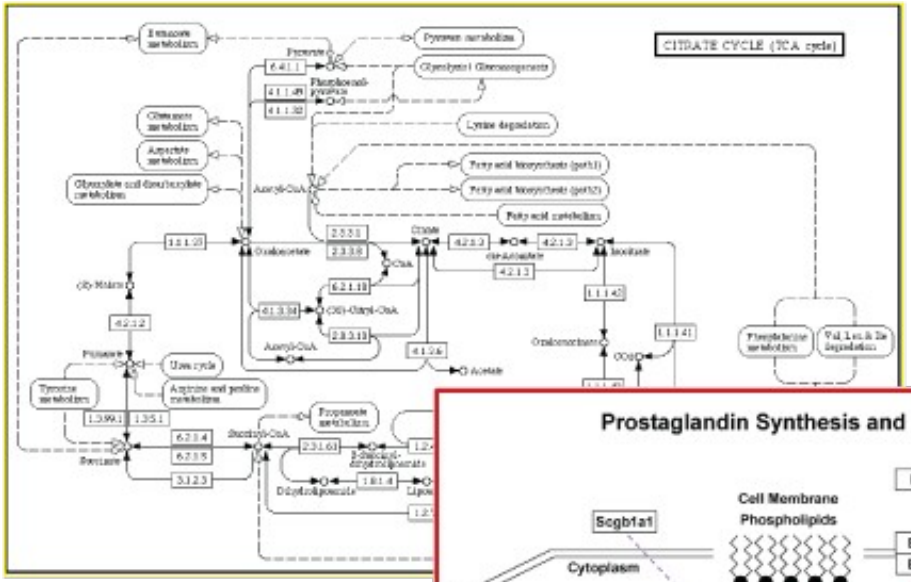
Alex Pico
Gladstone Institutes, UCSF

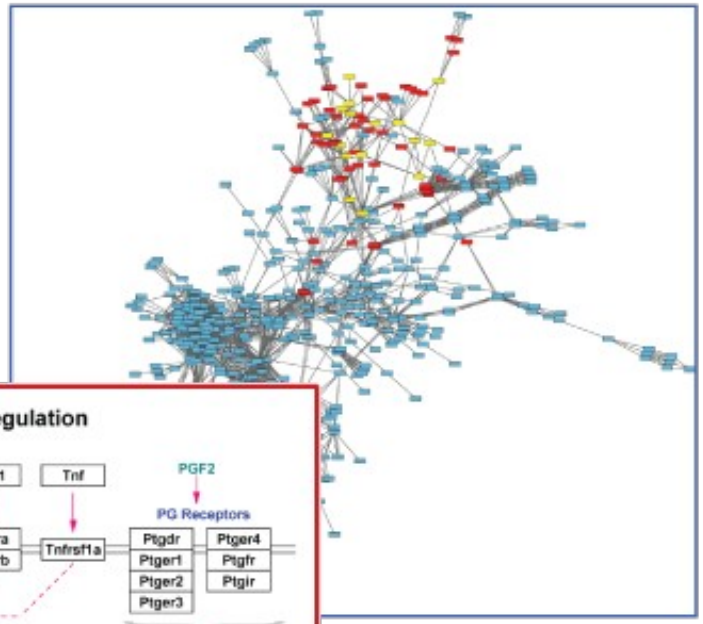
Pico, et al. (2008) *WikiPathways: pathway editing for the people*. PLoS Biol
Kelder, et al. (2009) *Mining Biological Pathways Using WikiPathways Web Services*. PLoS ONE

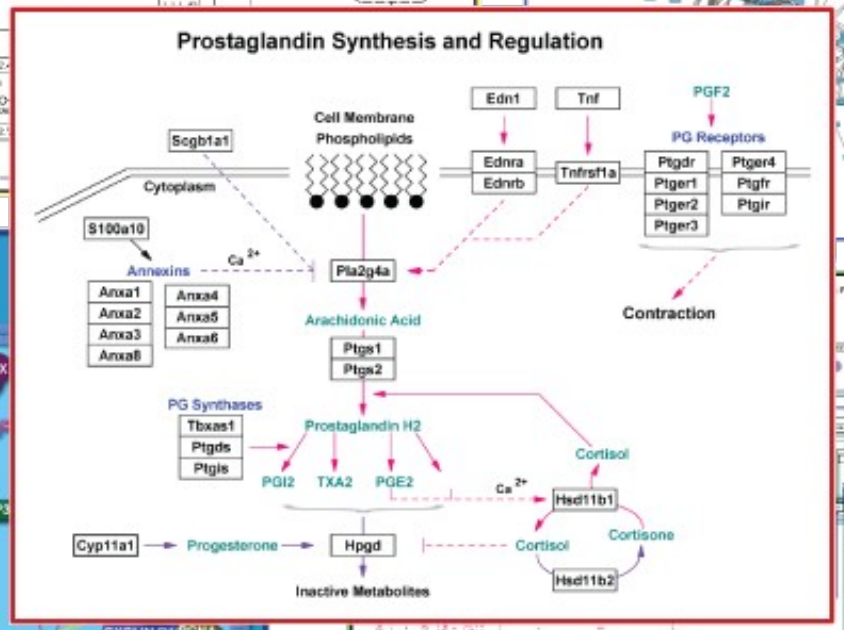
Title: TCA Cycle
Organism: Homo sapiens

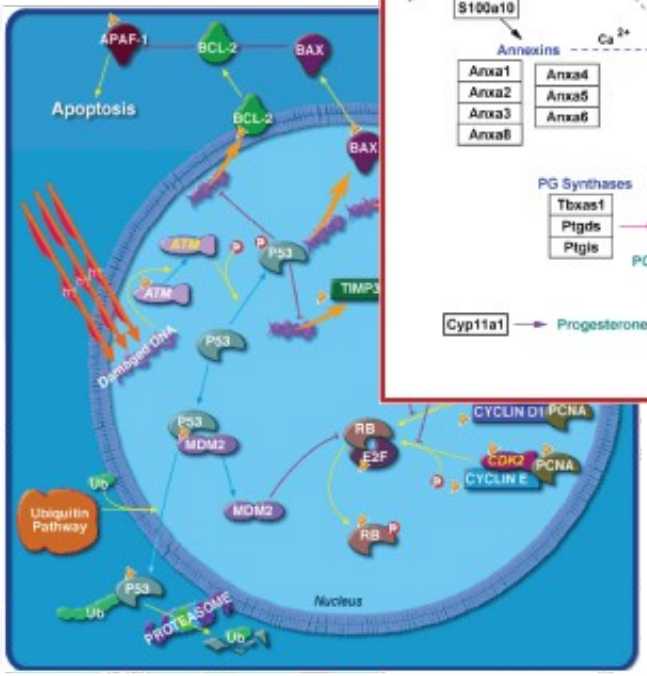


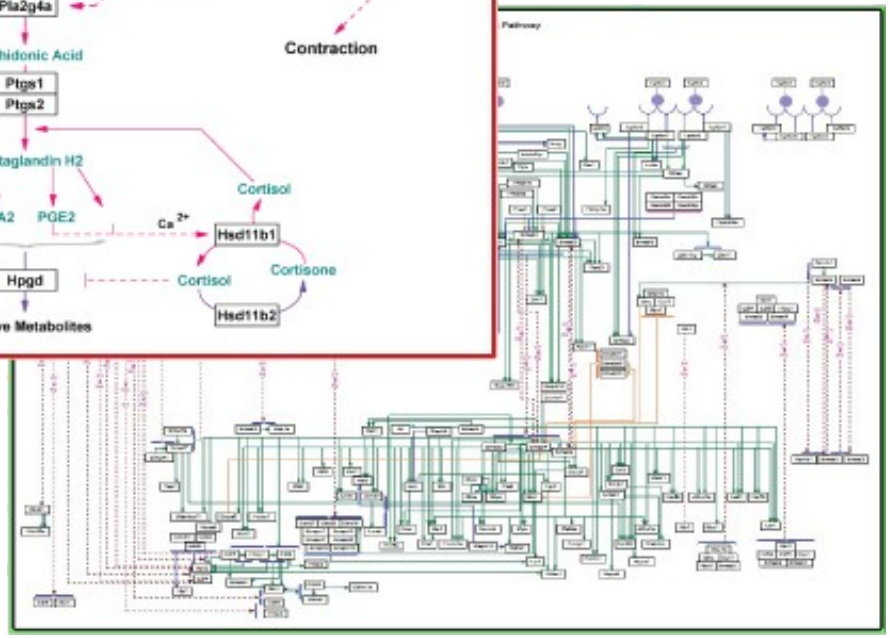




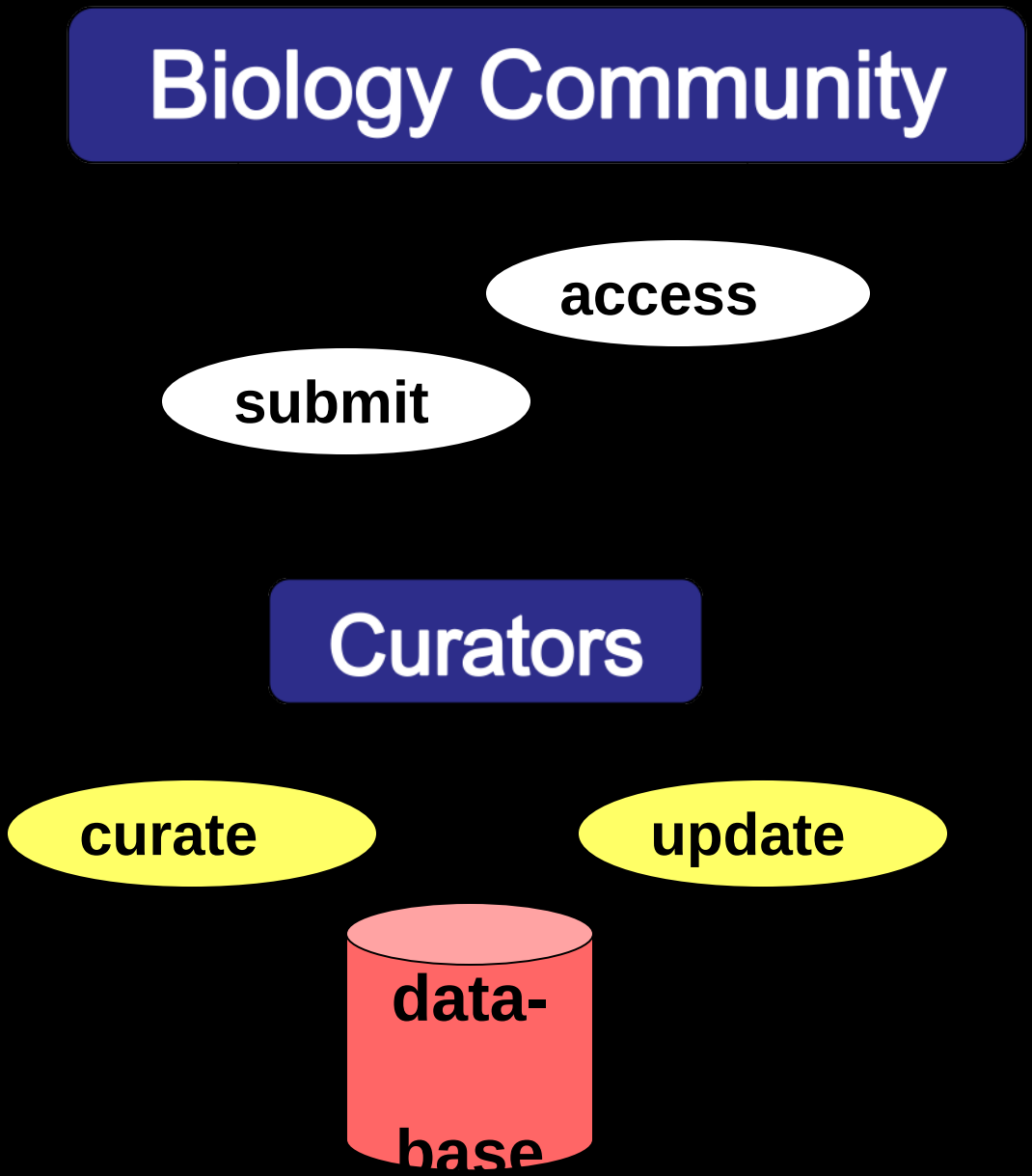


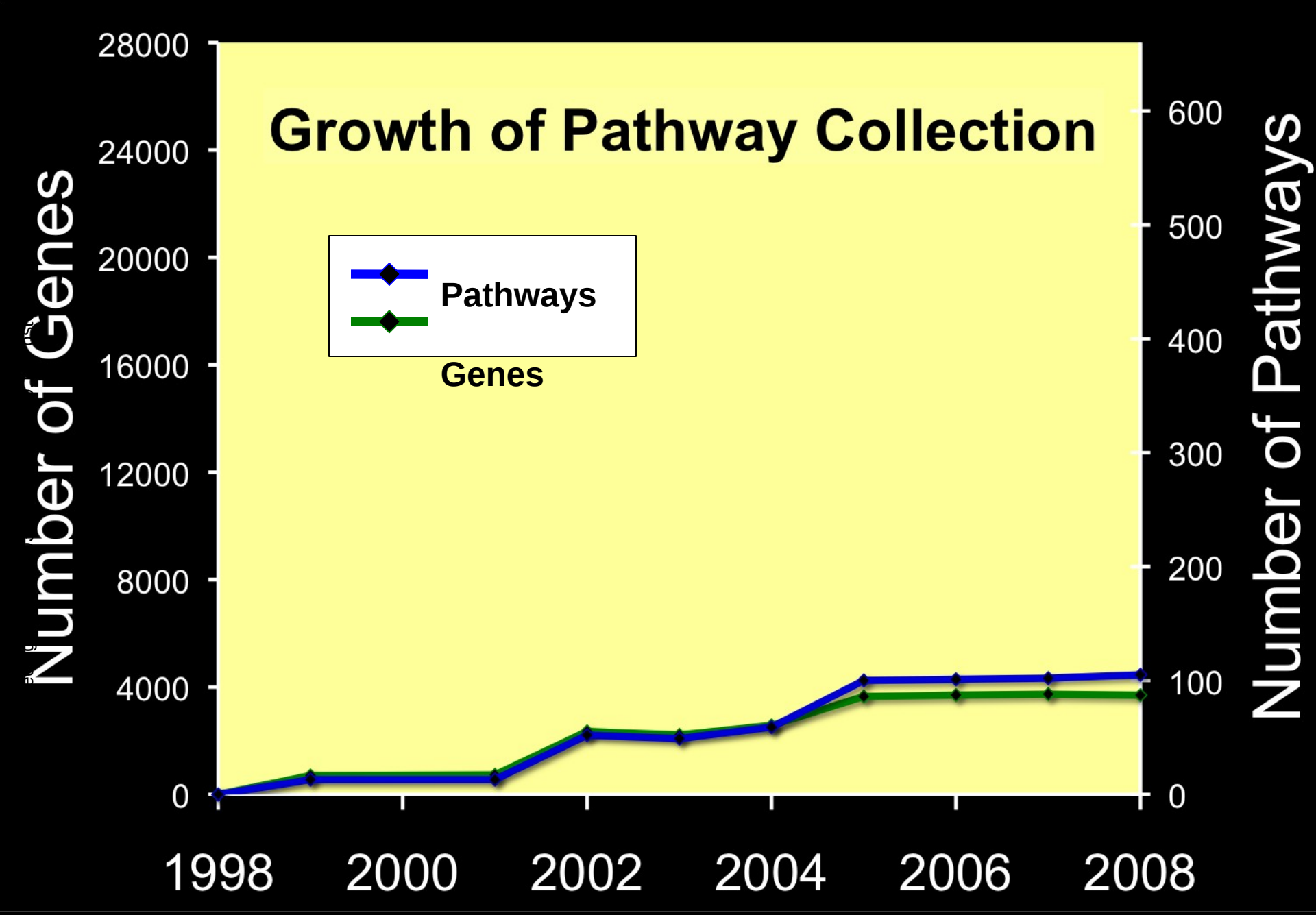




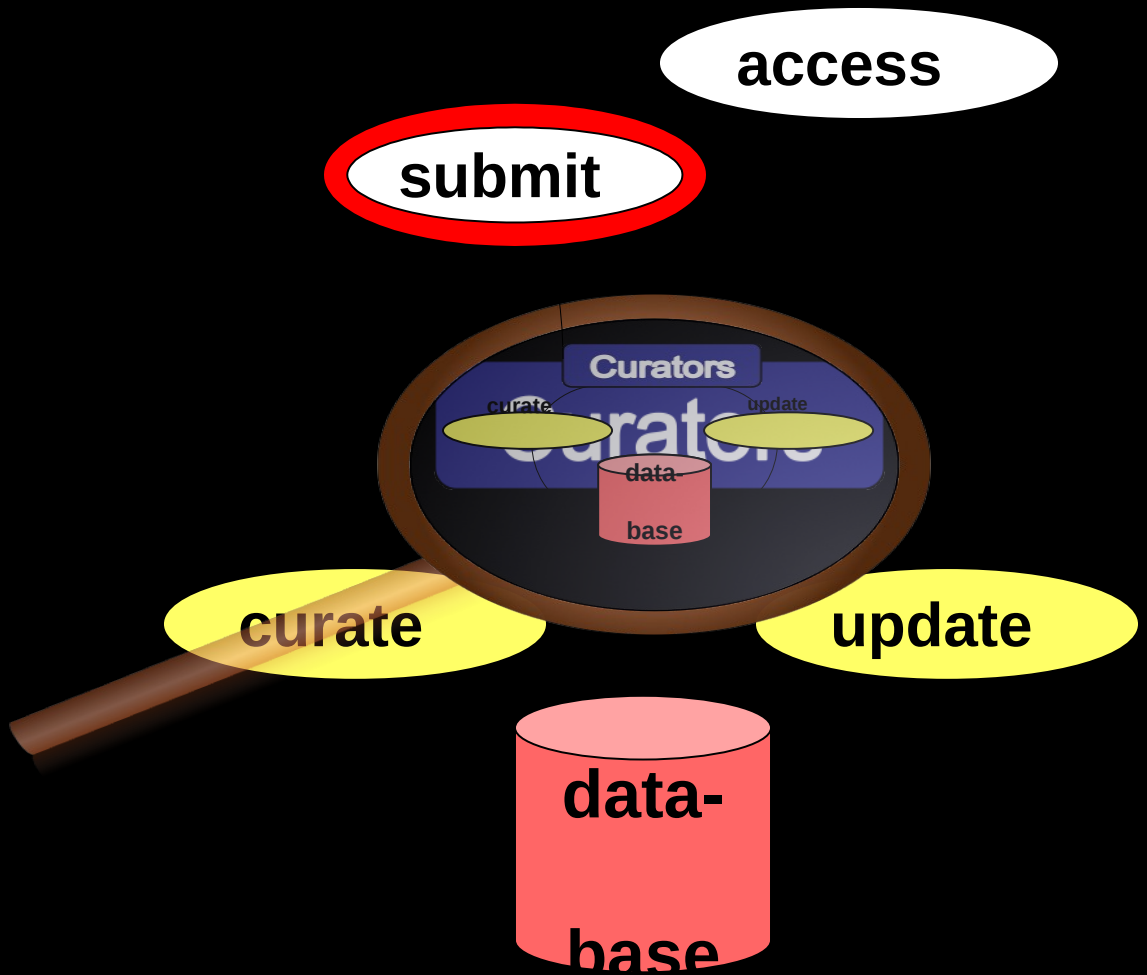


+ Collection
+ Annotation
+ Integration
+ Curation


Biology Community
access
submit
Curators
curate
update
data-
base


Growth of Pathway Collection
Pathways
Genes
Number of Genes
Number of Pathways
28000
24000
20000
16000
12000
8000
4000
0
600
500
400
300
200
100
0
1998
2000
2002
2004
2006
2008

Biology Community



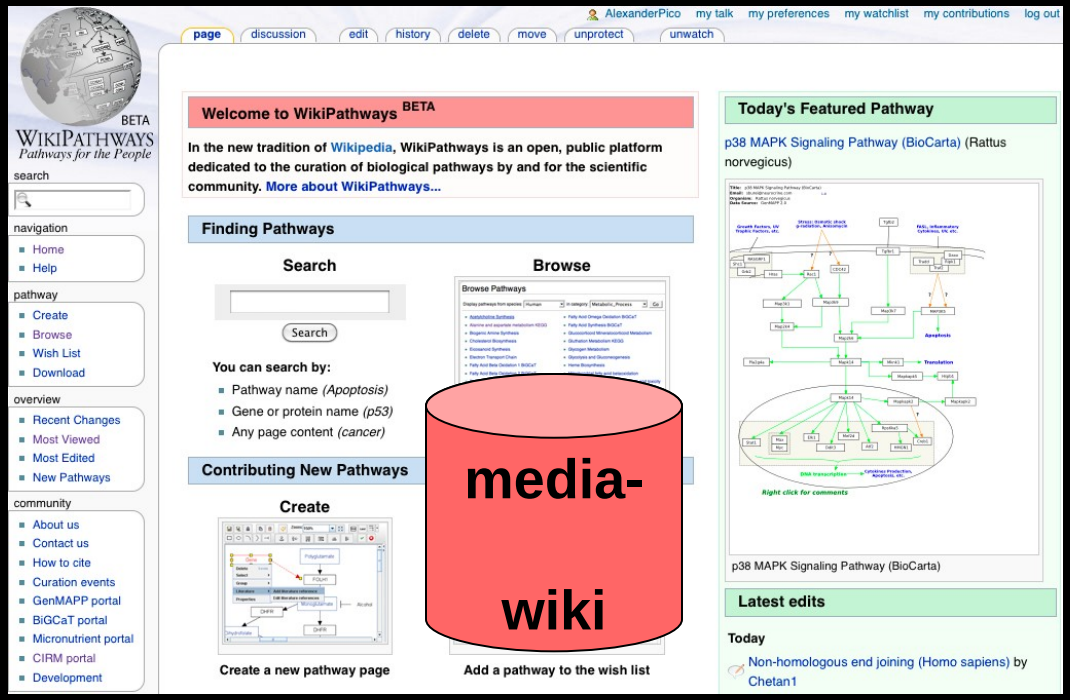
Biology Community

curate

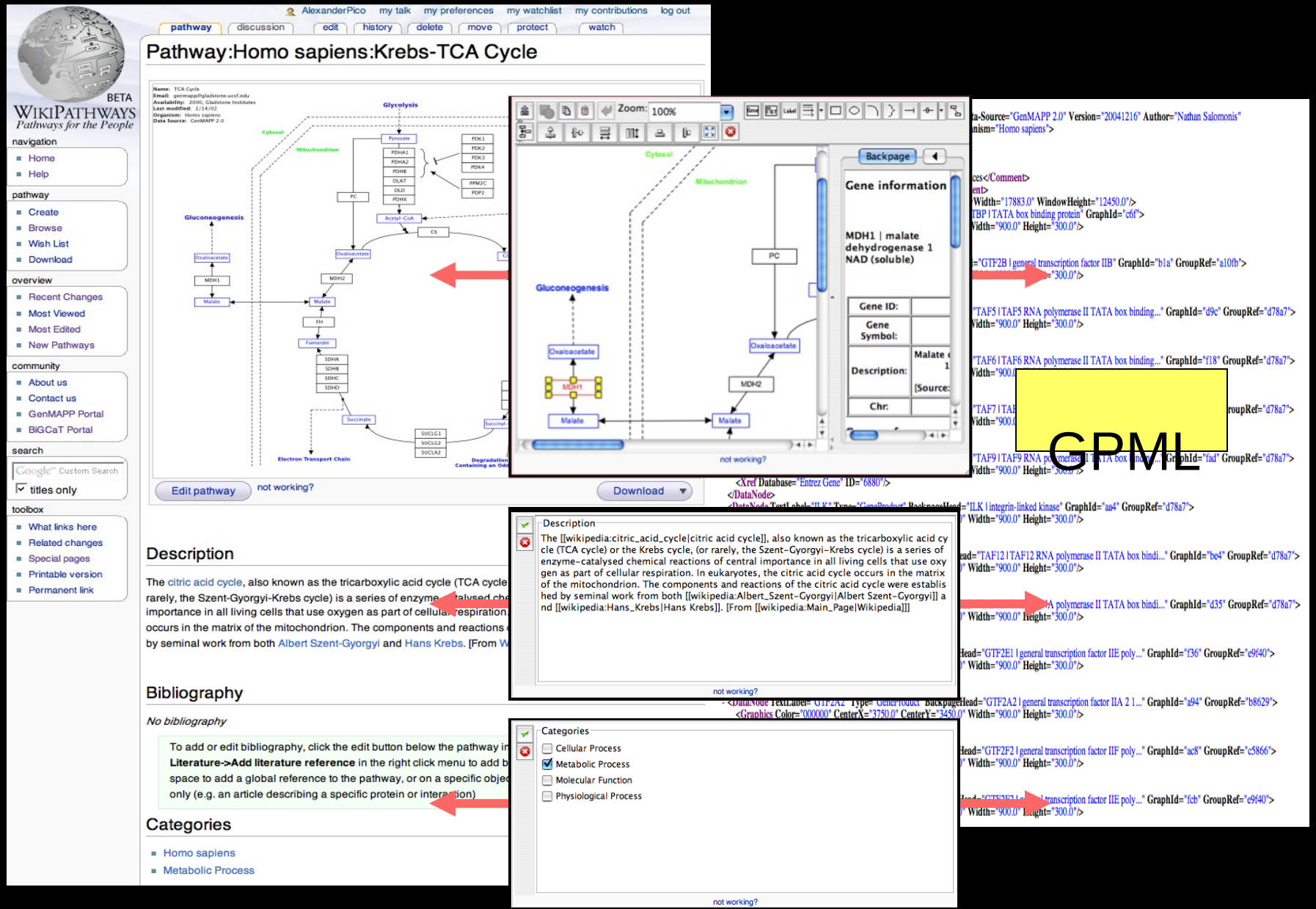
access

submit

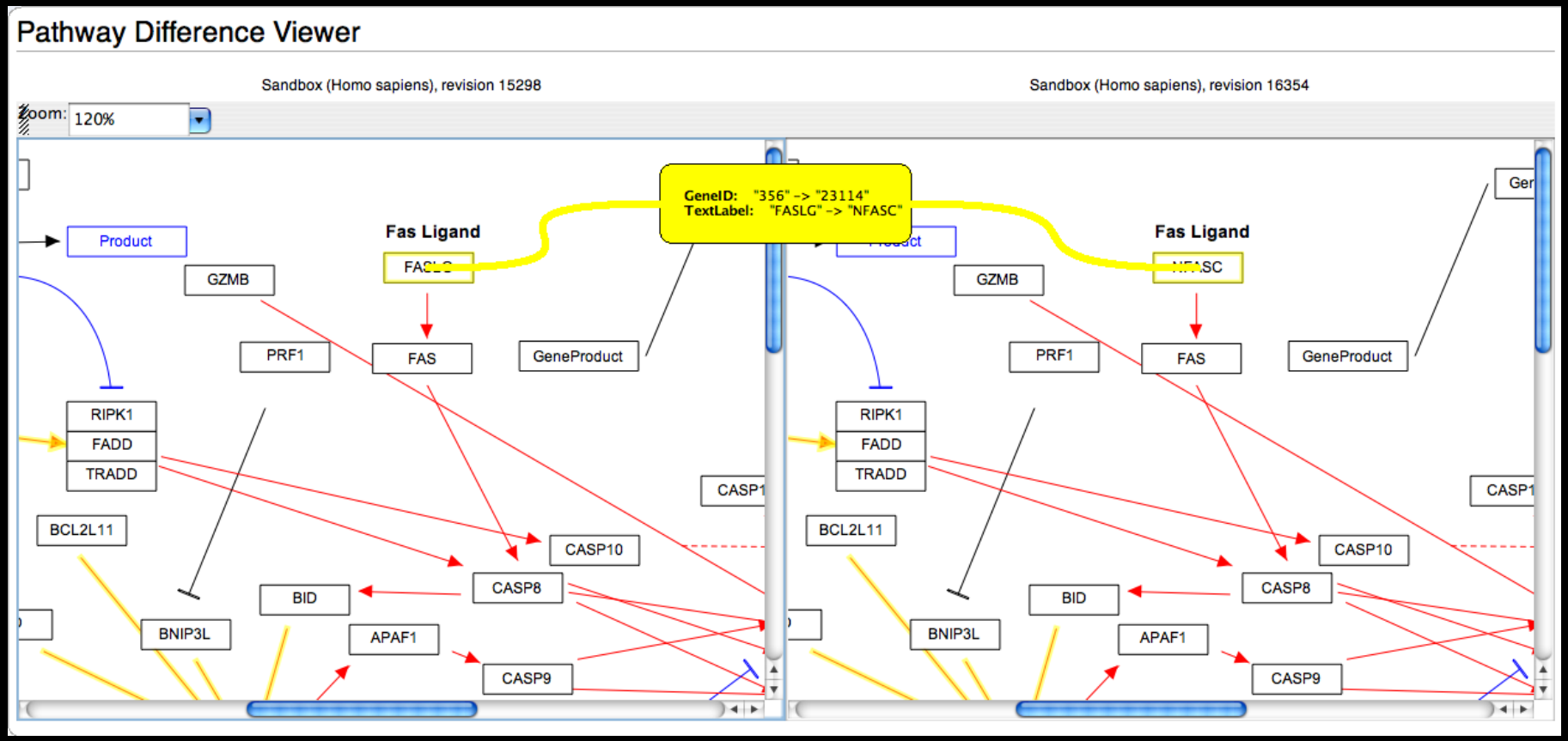
update



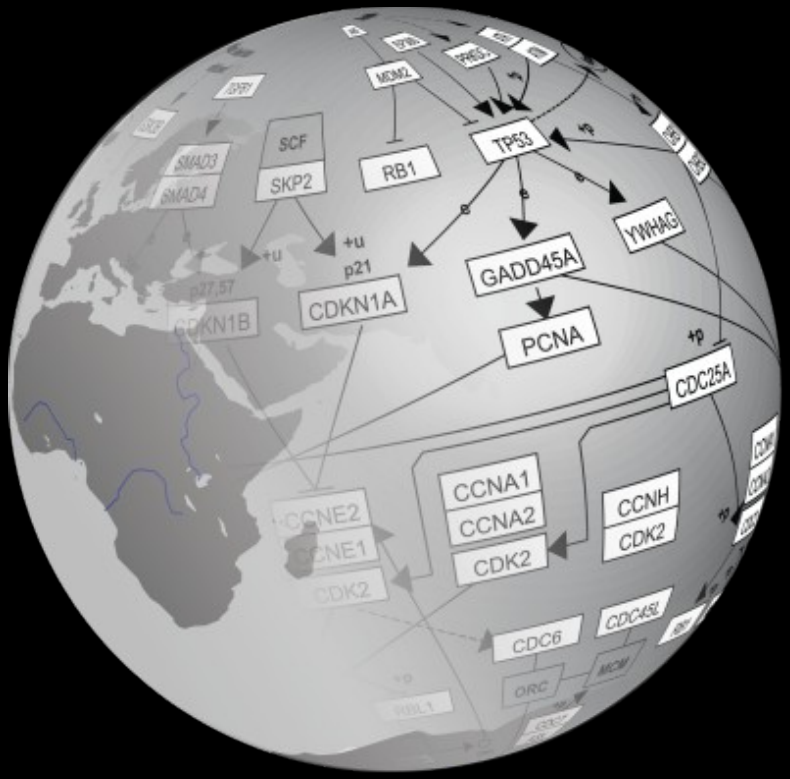
Under the Hood



Under the Hood



Demo


MDM2
TP53
SCF
SKP2
RB1
SMAD3
SMAD4
+u
p21
CDKN1A
GADD45A
YWHAG
PCNA
CDC25A
CCNA1
CCNA2
CDK2
CCNH
CDK2
CDC6
ORC

WikiPathways Today

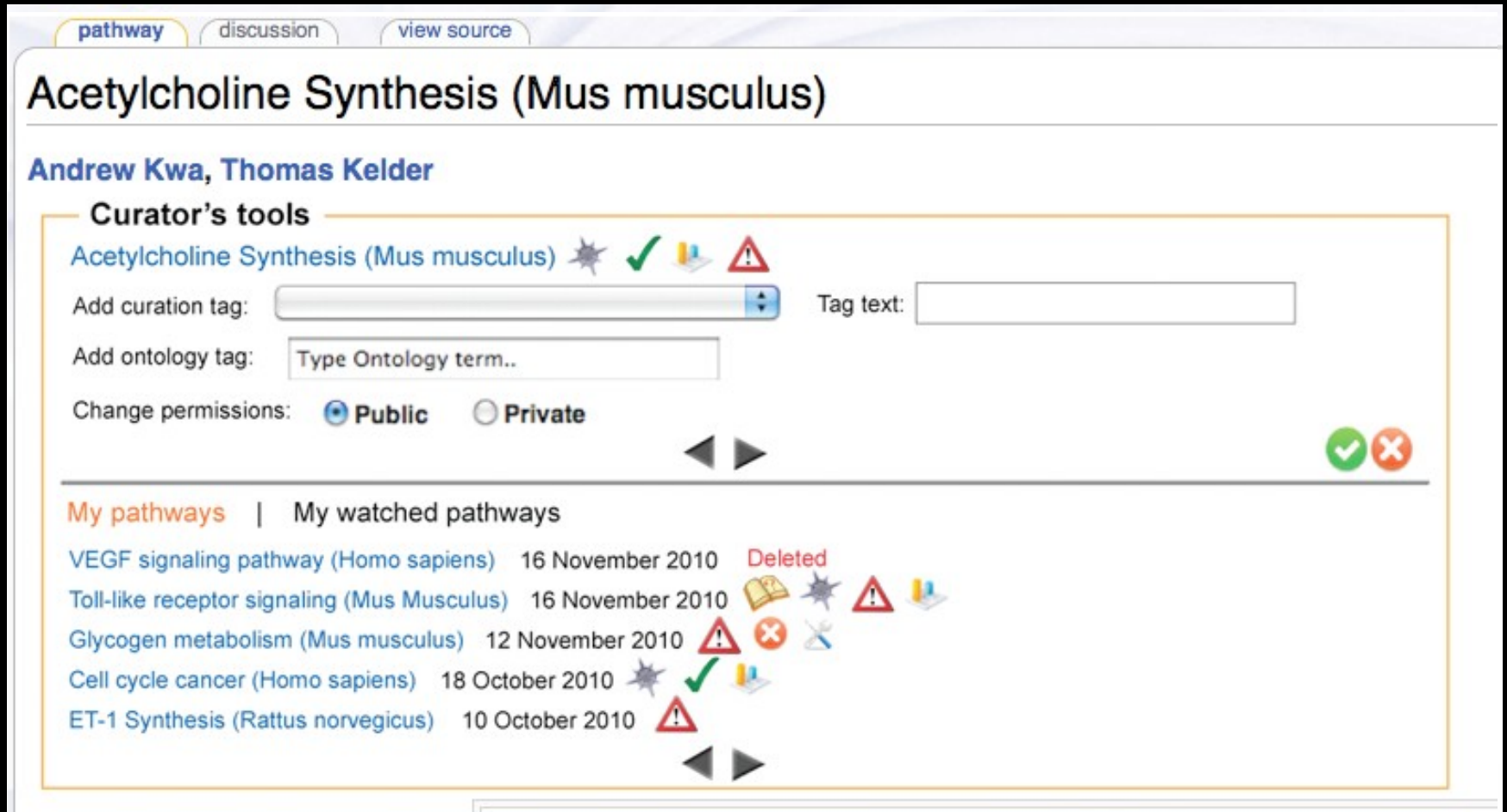
- Lowering threshold for contributions
- Attribution for authors per pathway
- Utilizing pathways as research tools
- Facilitating communities

Future Development

- More scripts bots
- Curator tools

Future Development

- More scripts bots
- Curator tools



Future Development

- More scripts bots
- Curator tools
- Social rewards

Contributing a new pathway

Author of most viewed pathway

Curating 5 pathways

WikiPathways Milestones

- **Online (Mar ’07)** ✓*Success!*
- **First unknown user (Jan ’08)**

WikiPathways Milestones

- Online (Mar ’07) ✓*Success!*
- First unknown user (Jan ‘08)

- **Email from “father of wiki”**

Ward Cunningham

From Wikipedia, the free encyclopedia

"Howard Cunningham" redirects here. For the fictional character, see Happy Days.

Howard G. "Ward" Cunningham (born May 26, 1949) is an American computer programmer who developed the first wiki. A pioneer in both design patterns and Extreme Programming, he started programming the software WikiWikiWeb in 1994 and installed it on the website of his software consultancy, Cunningham & Cunningham (commonly known by its domain name, **c2.com**), on March 25, 1995, as an add-on to the Portland Pattern Repository. He currently lives in Beaverton, Oregon and is the chief technology officer for AboutUs.

He has co-authored a book about wikis, titled *The Wiki Way*, and also invented Framework for Integrated Tests. He was a keynote speaker at the first three instances of the WikiSym conference series on wiki research and practice.

Ward Cunningham

Ward Cunningham at the Wikimedia Foundation (2009)

“You may be interested, When I created the first wiki 13 years ago I had in the back of my mind the creation of a community of practicing software professionals (my discipline) that could engage in a "simplified scholarship" inspired by our best scientific disciplines. **Imagine my satisfaction when my internet techniques are found attractive by the communities that most inspired me**.”

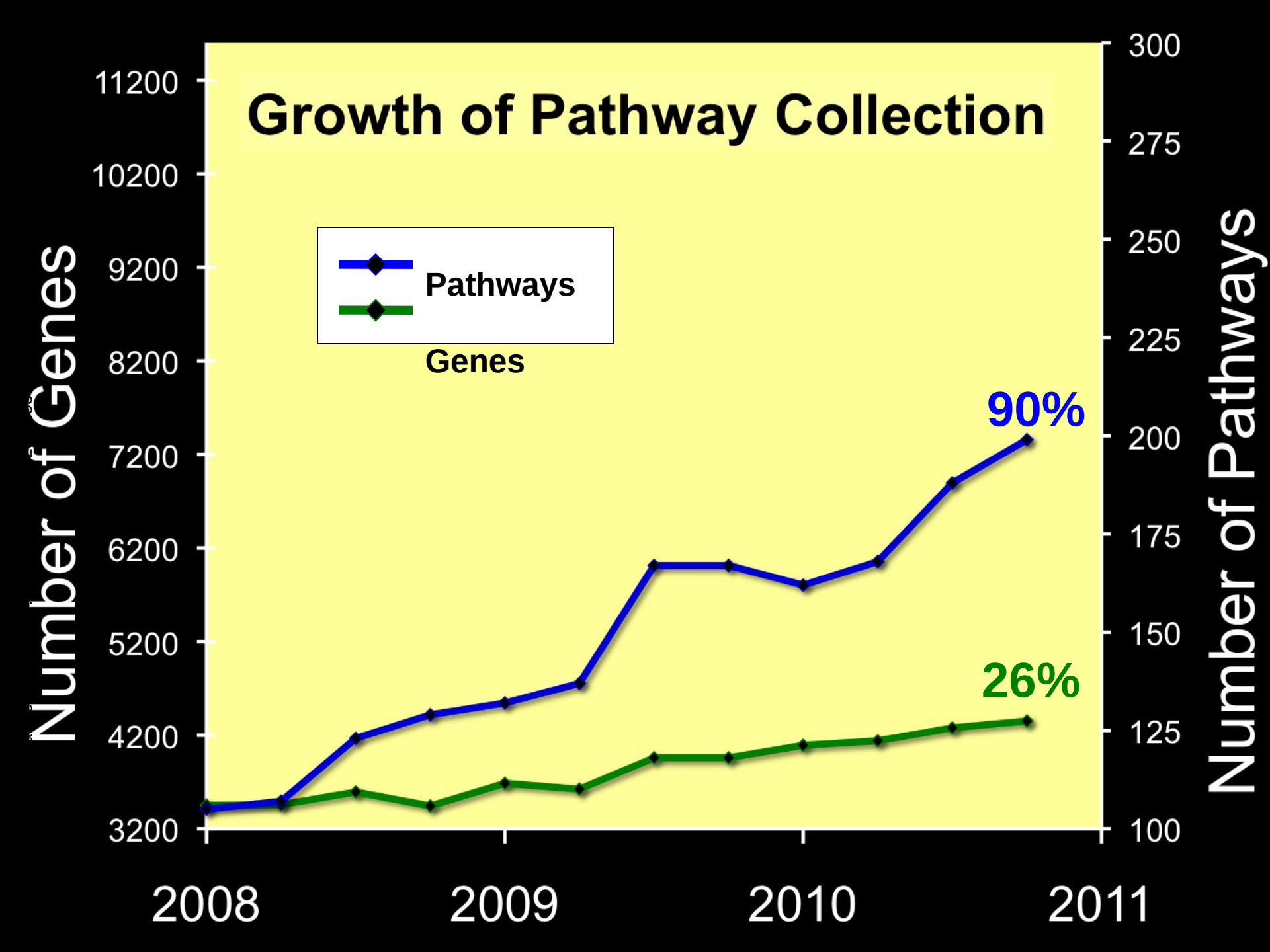
Ward Cunningham, August 2008

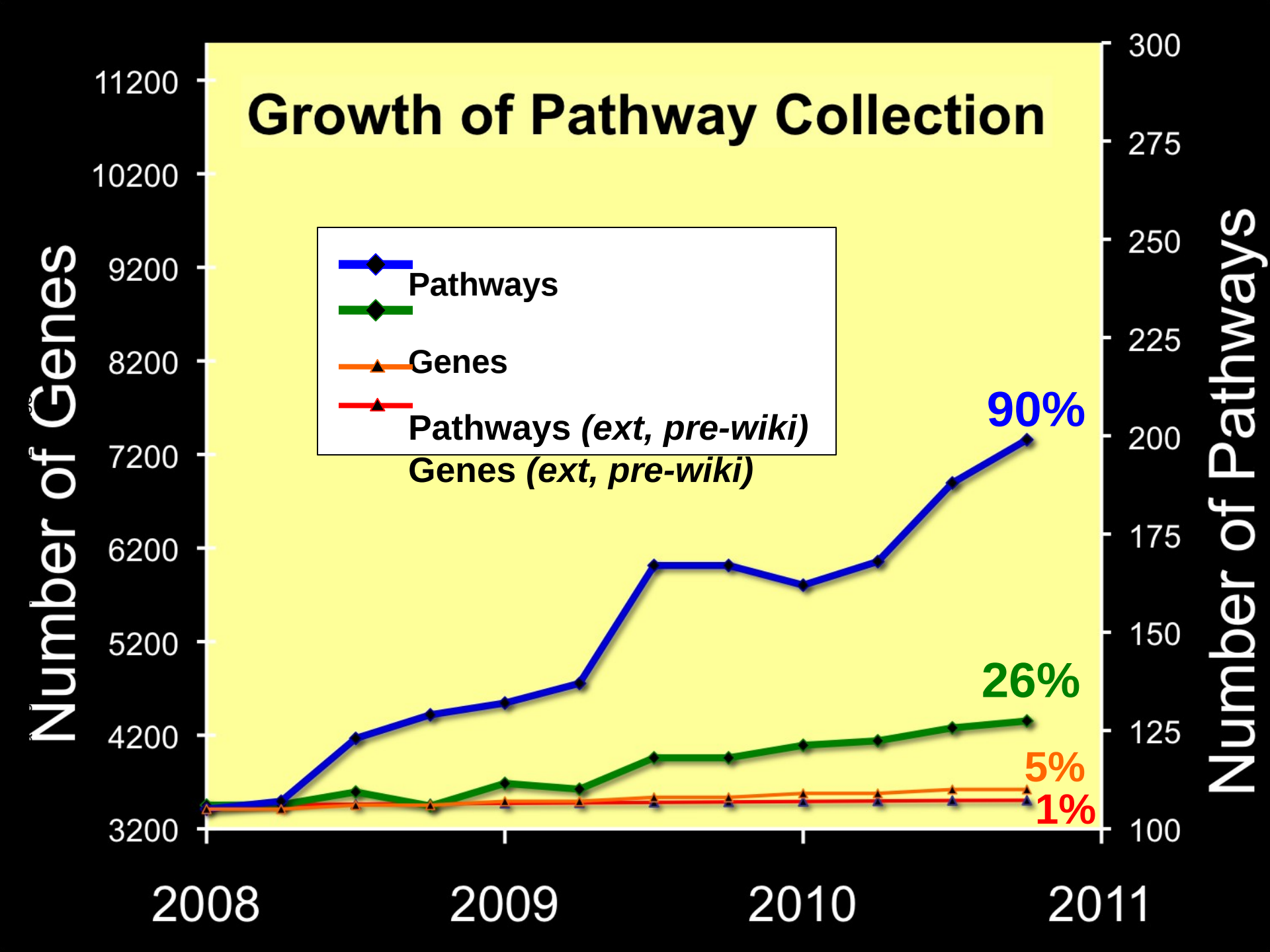
WikiPathways Milestones

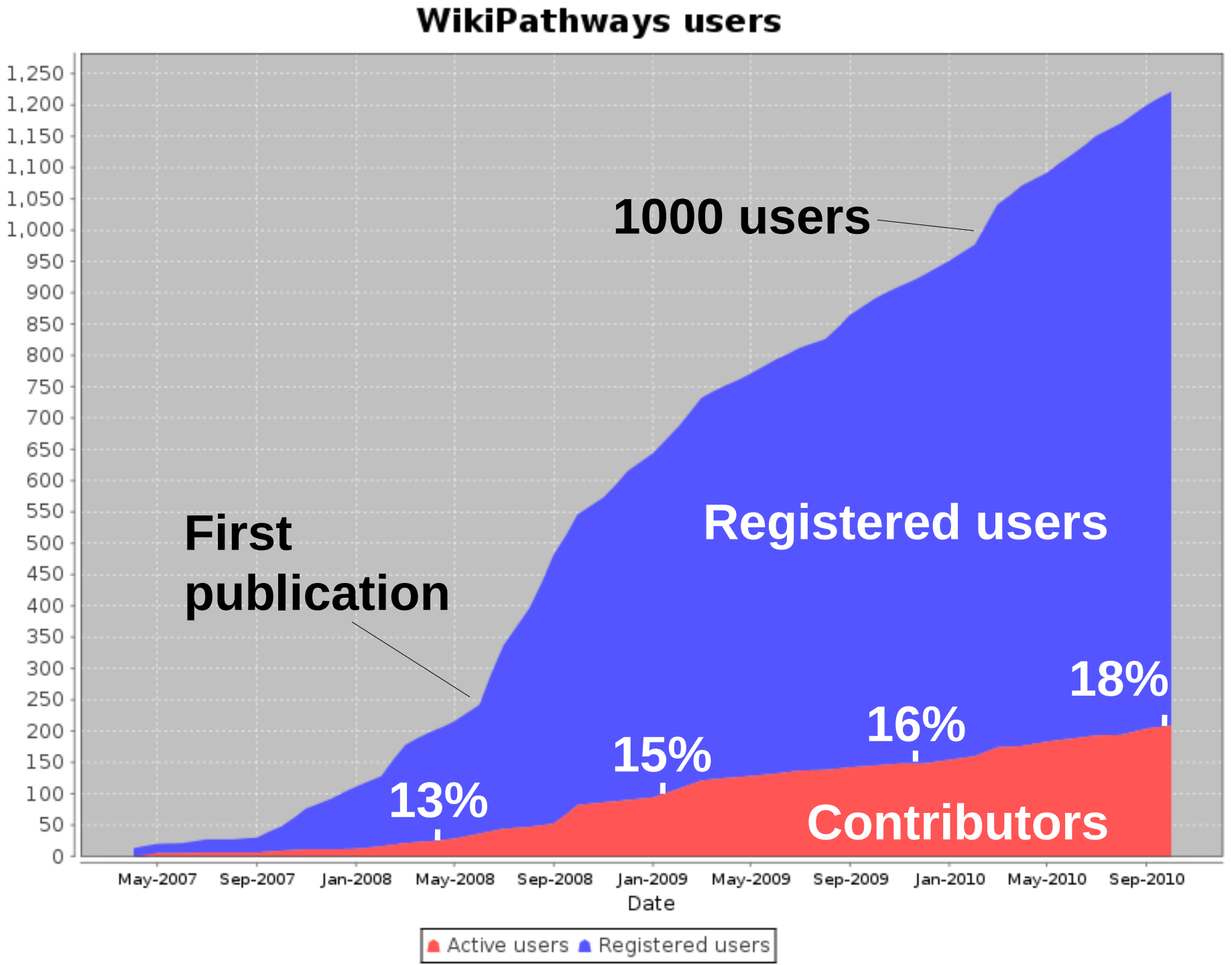
- Online (Mar ’07) ✓*Success!*
- First unknown user (Jan ‘08)

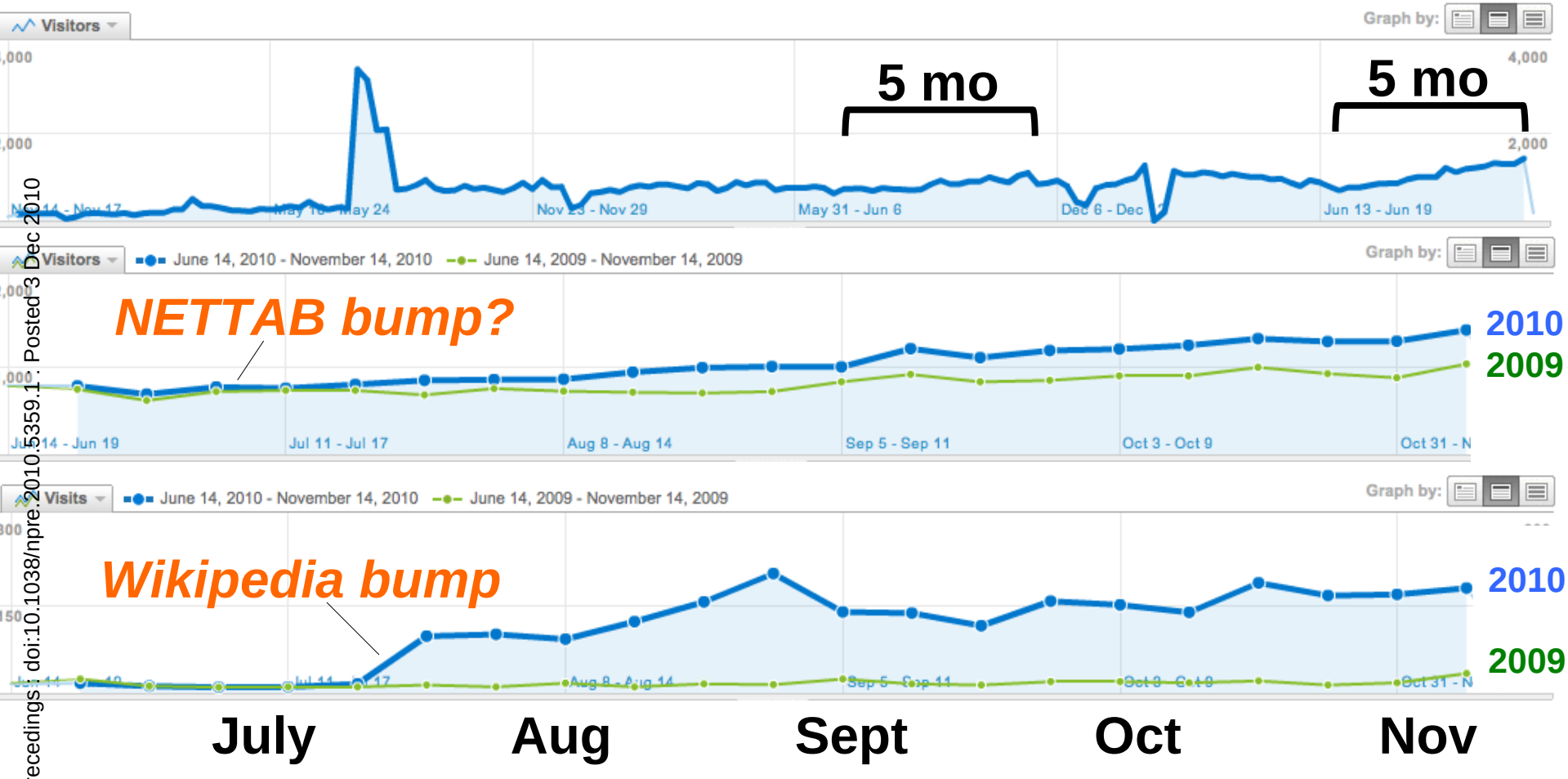
- Email from “father of wiki”

- **Quantity and quality of content**


Growth of Pathway Collection
Pathways
Genes
90%
26%
Number of Genes
Number of Pathways
11200
10200
9200
8200
7200
6200
5200
4200
3200
300
275
250
225
200
175
150
125
100
2008
2009
2010
2011


Growth of Pathway Collection
Number of Genes
Number of Pathways
11200
10200
9200
8200
7200
6200
5200
4200
3200
300
275
250
225
200
175
150
125
100
2008
2009
2010
2011
Pathways
Genes
Pathways (ext, pre-wiki)
Genes (ext, pre-wiki)
90%
26%
5%
1%





Pyruvate dehydrogenase (lipoamide) alpha 1

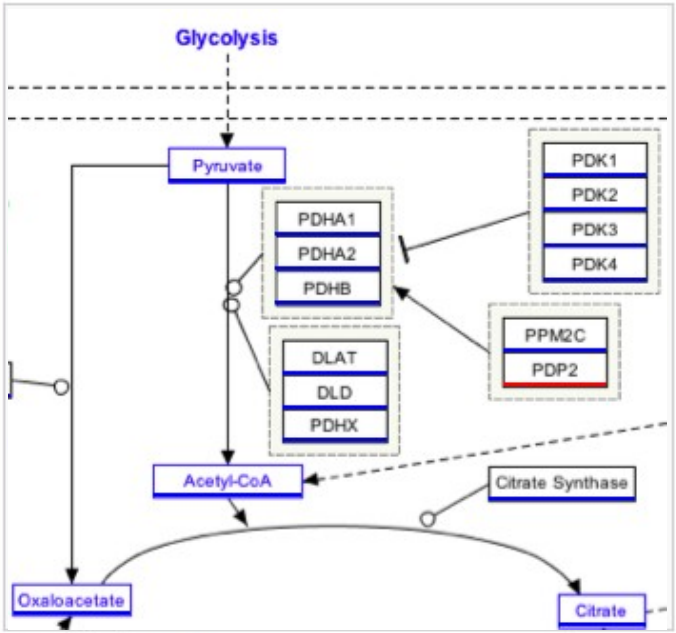
From Wikipedia, the free encyclopedia

Pyruvate dehydrogenase E1 component subunit alpha, somatic form, mitochondrial is an enzyme that in humans is encoded by the *PDHA1* gene. edit

The pyruvate dehydrogenase complex is a nuclear-encoded mitochondrial matrix multienzyme complex that provides the primary link between glycolysis and the tricarboxylic acid (TCA) cycle by catalyzing the irreversible conversion of pyruvate into acetyl-CoA. The PDH complex is composed of multiple copies of 3 enzymes: E1 (PDHA1); dihydrolipoyl transacetylase (DLAT; MIM 608770) (E2; EC 2.3.1.12); and dihydrolipoyl dehydrogenase (DLD; MIM 238331) (E3; EC 1.8.1.4). The E1 enzyme is a heterotetramer of 2 alpha and 2 beta subunits. The E1-alpha subunit contains the E1 active site and plays a key role in the function of the PDH complex (Brown et al., 1994).[supplied by OMIM][1]

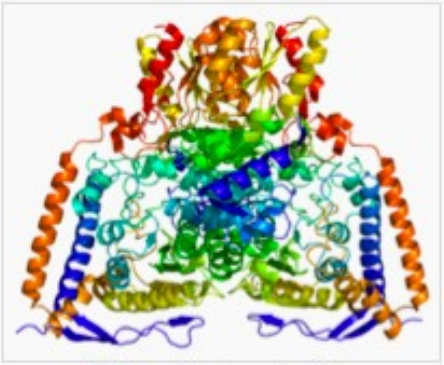
Interactive pathway map [edit]

Click on genes, proteins and metabolites below to link to respective articles. [2]



Citric acid cycle edit

Pyruvate dehydrogenase (lipoamide) alpha 1



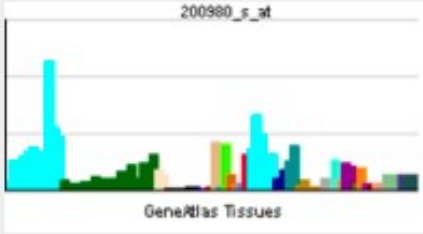
PDB rendering based on 1ni4.

Available structures	[show]

Identifiers	
Symbols	PDHA1; PDHA; PDHCE1A; PHE1A
External IDs	OMIM: 300502 MGI: 97532 HomoloGene: 37282 GeneCards: PDHA1 Gene

Gene Ontology	[show]

RNA expression pattern



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Interaction
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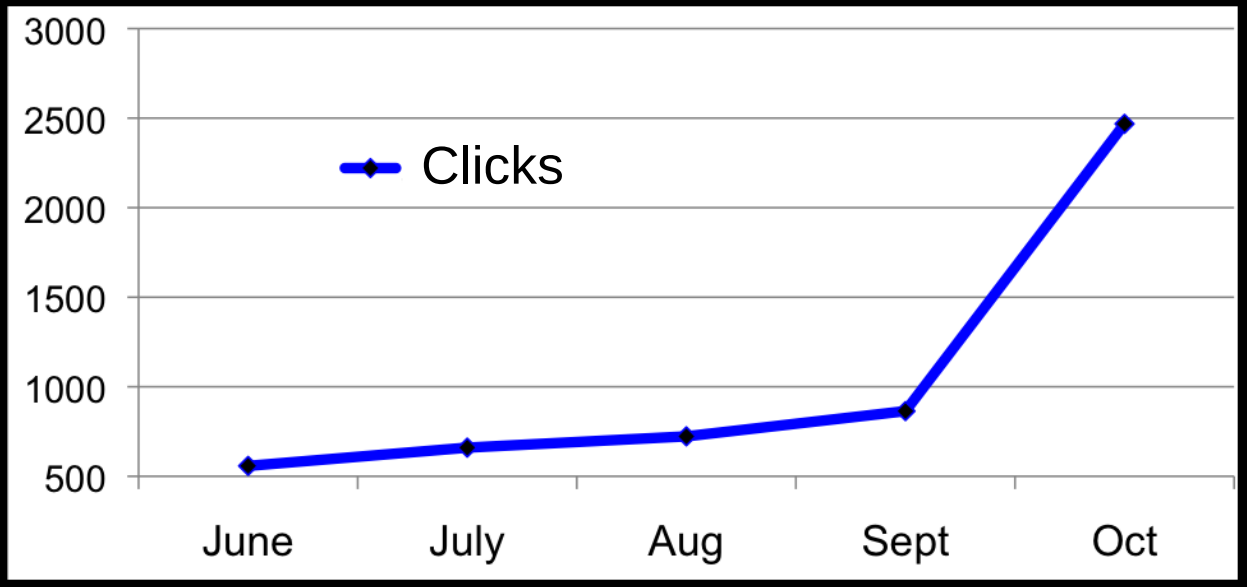
Print/export

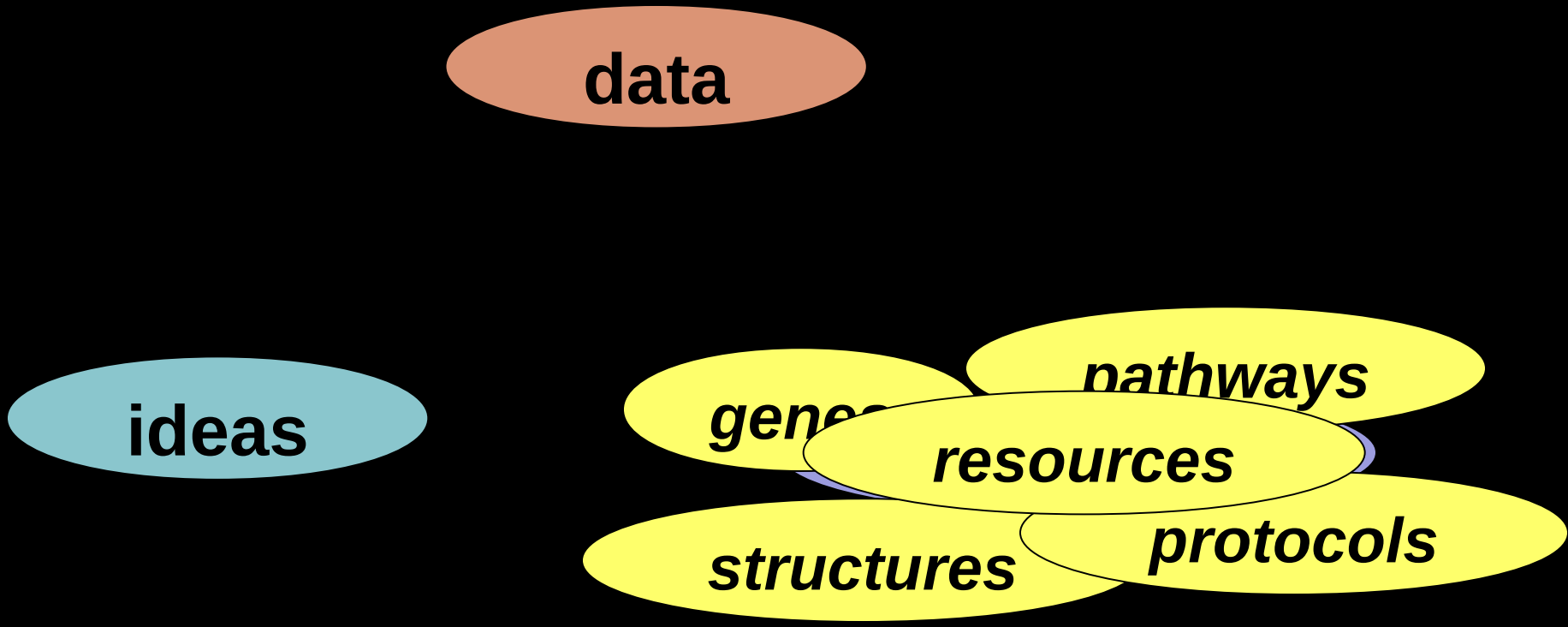
Who cares about biological wikis?

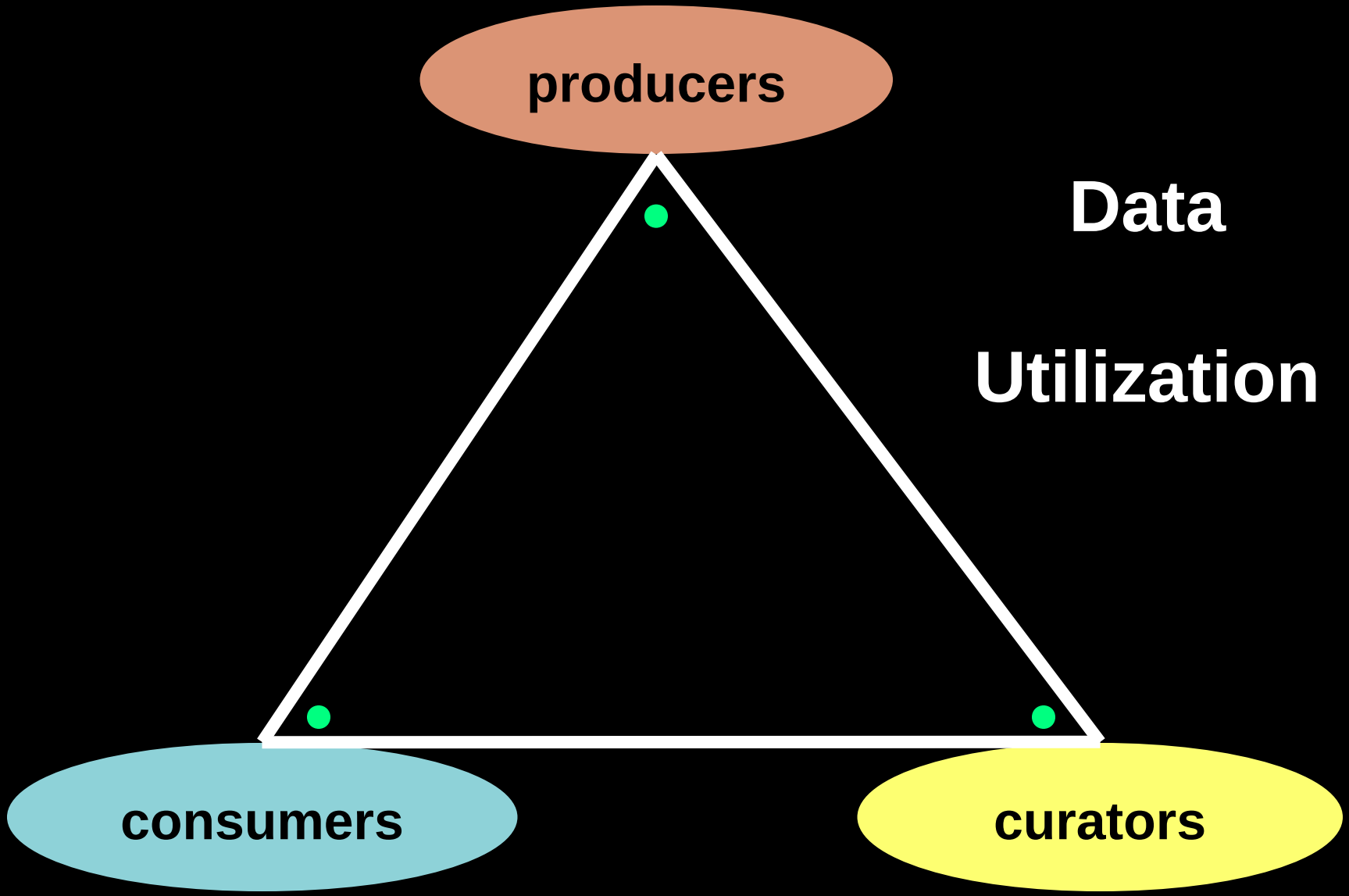
biology + wiki = academics

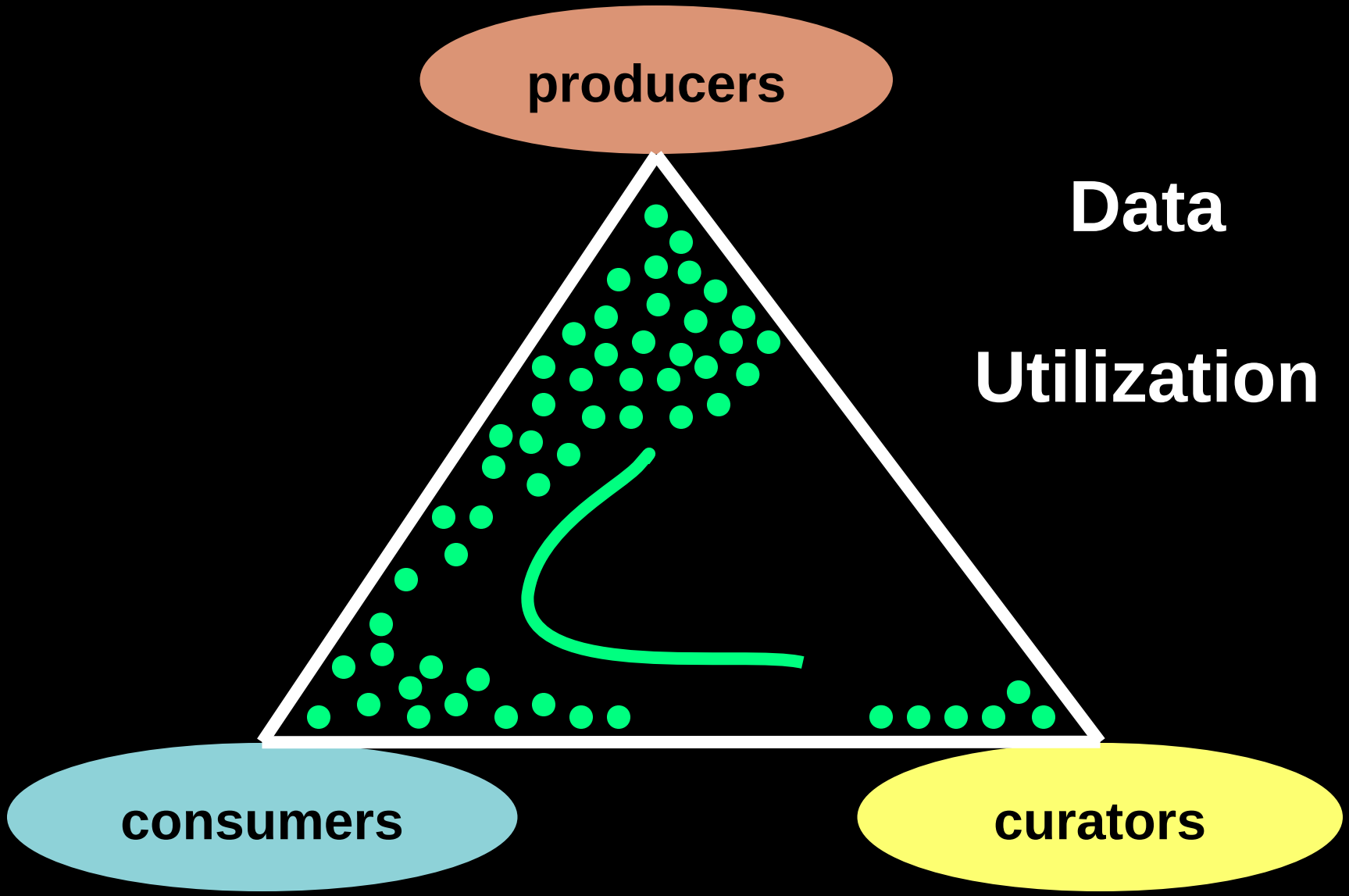
Who cares about biological wikis?

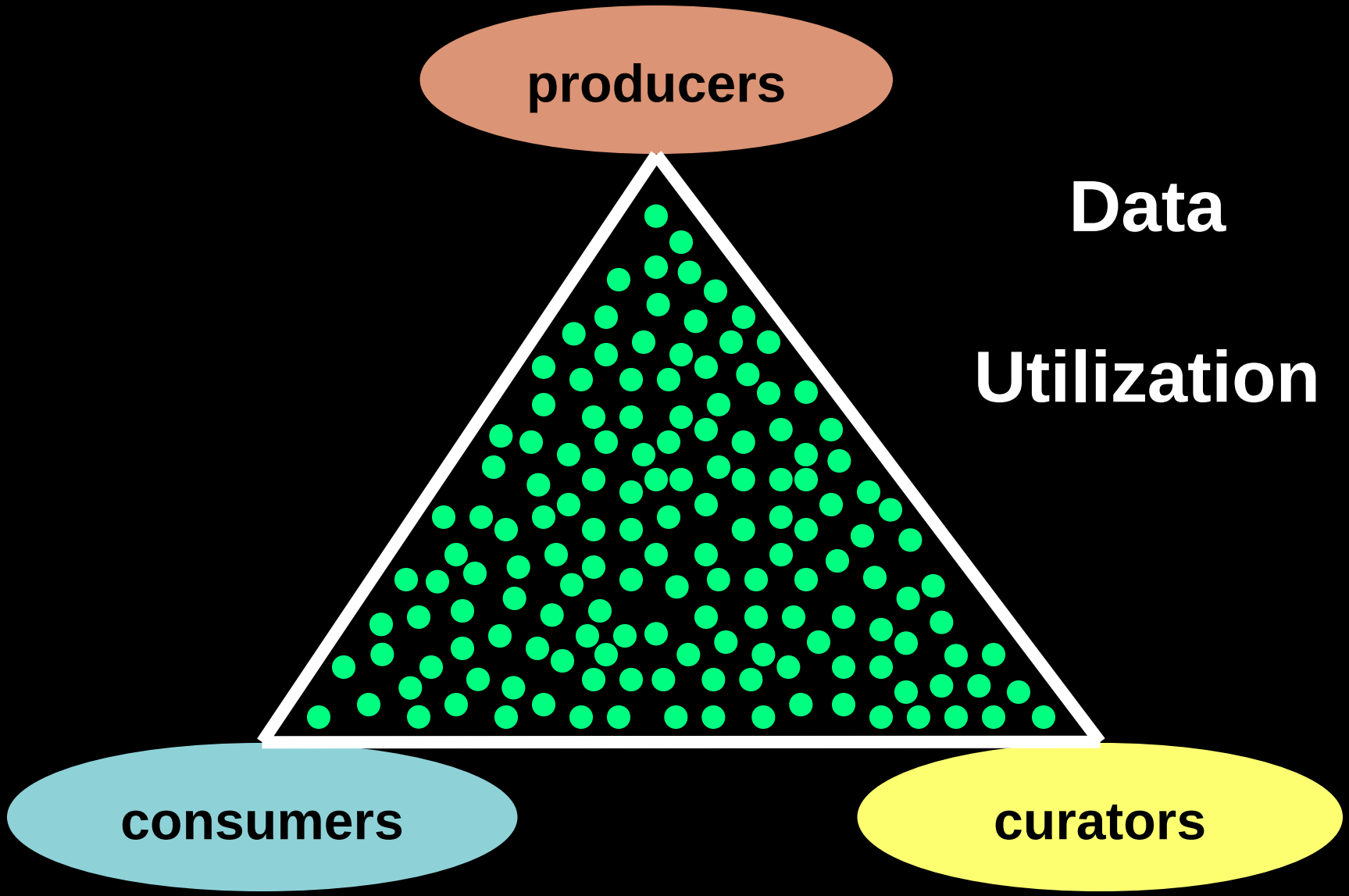


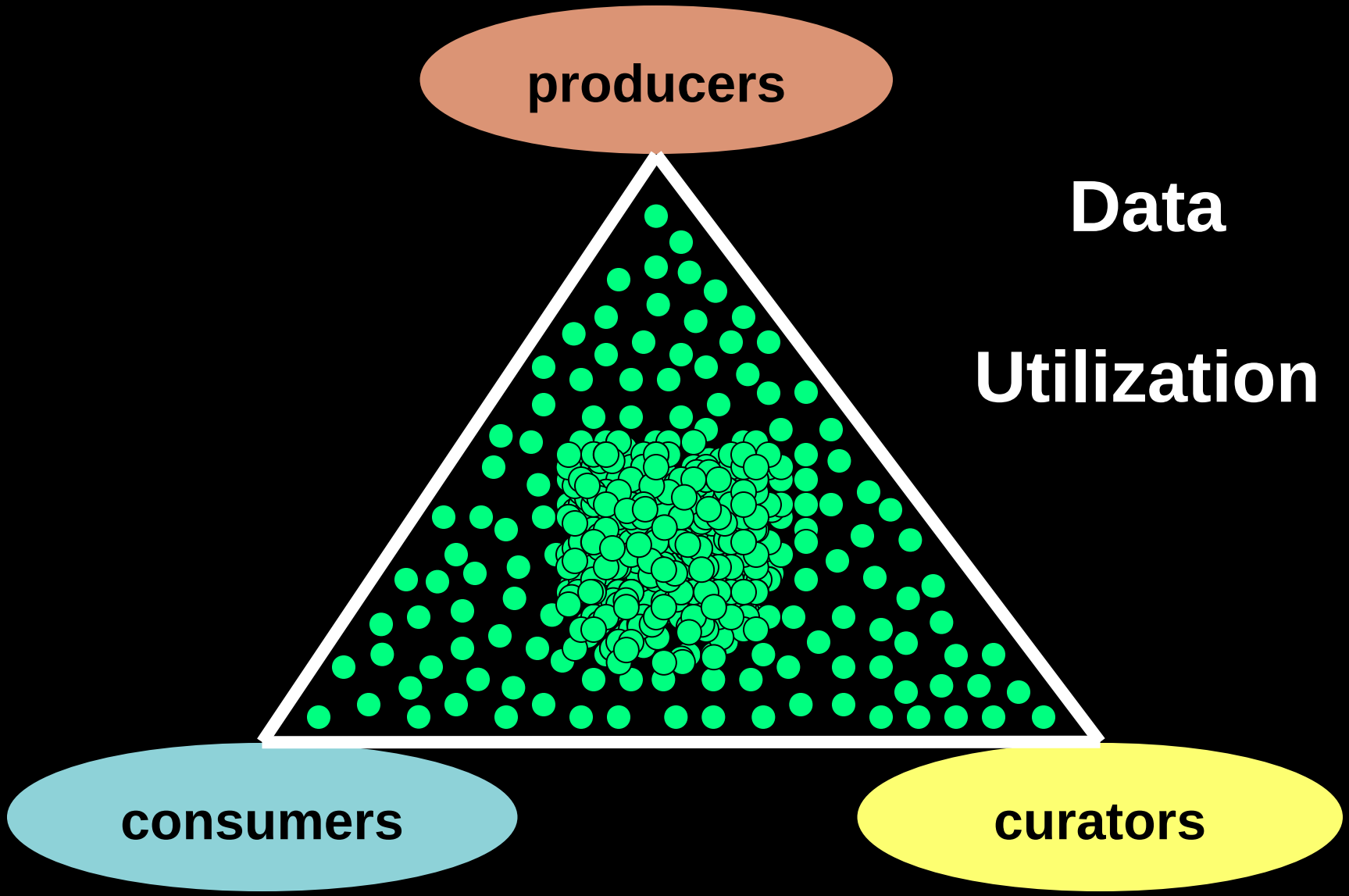
Linkouts to Wikipedia from NCBI taxonomy


data
ideas
pathways
resources
protocols
structures


producers
Data
Utilization
consumers
curators


producers
Data
Utilization
consumers
curators


producers
Data
Utilization
consumers
curators


producers
Data
Utilization
consumers
curators

Collaborative Development

- Oregon State University
  - Jaiswal lab (plant pathways)
- NIH, NCI
  - MIMs group (molecular interaction maps)
- Stanford University
  - PharmGKB (curation tools)
- Google Summer of Code
  - 1000 student and 150 organizations
  - 90 countries represented
  - *33 student fellowships paid for by Google*

Acknowledgements

BiGCaT Dept, Maastricht, NL

Thomas Kelder
Martijn van Iersel
Martina Kutmon
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PharmGKB, Stanford

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Margot Sunshine
Augustine Luna

Conklin Lab, UCSF

Kristina Hanspers
Nathan Salomonis
Bruce Conklin

Jaiswal Lab, OSU

Pankaj Jaiswal
Justin Elser
Palitha dharmawardhana

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Adem Bilican
Chetan Bansal
Jianjiong Gao
Bing Liu