

# Reflect: an augmented browsing tool for life scientist

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# Outline

- Short introduction Reflect
- Advanced features and the back-end
- Planned new features

# Life Science Data

Galperin, Cochrane

Nucleic Acids Research annual Database Issue and the NAR online Molecular Biology Database Collection in 2011

Lists 1330 actual databases

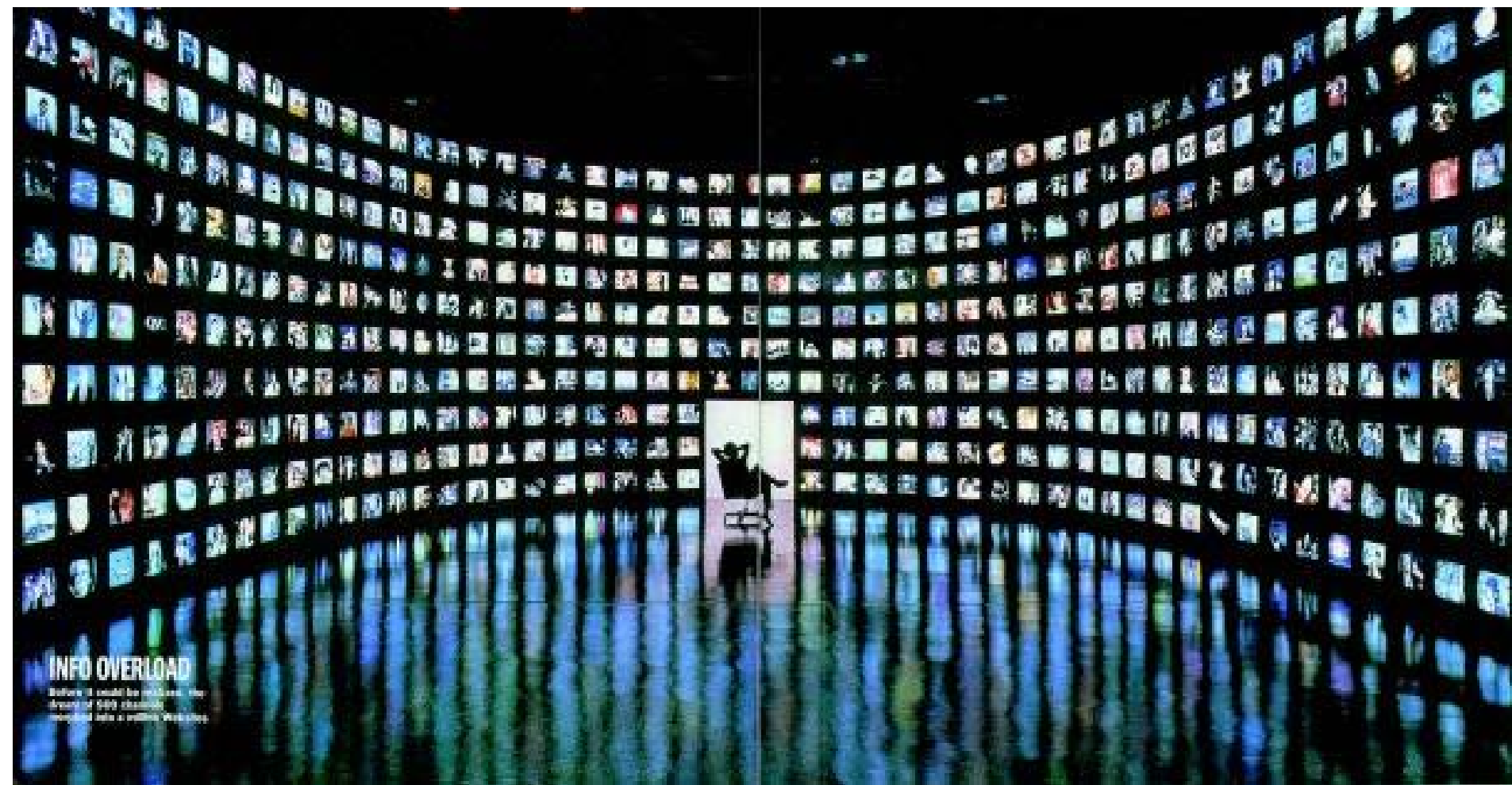


Gary Benson

Nucleic Acids Research annual Web Server Issue in 2011 , Nucl. Acids Res. 2011

Lists more than ~3200 web servers



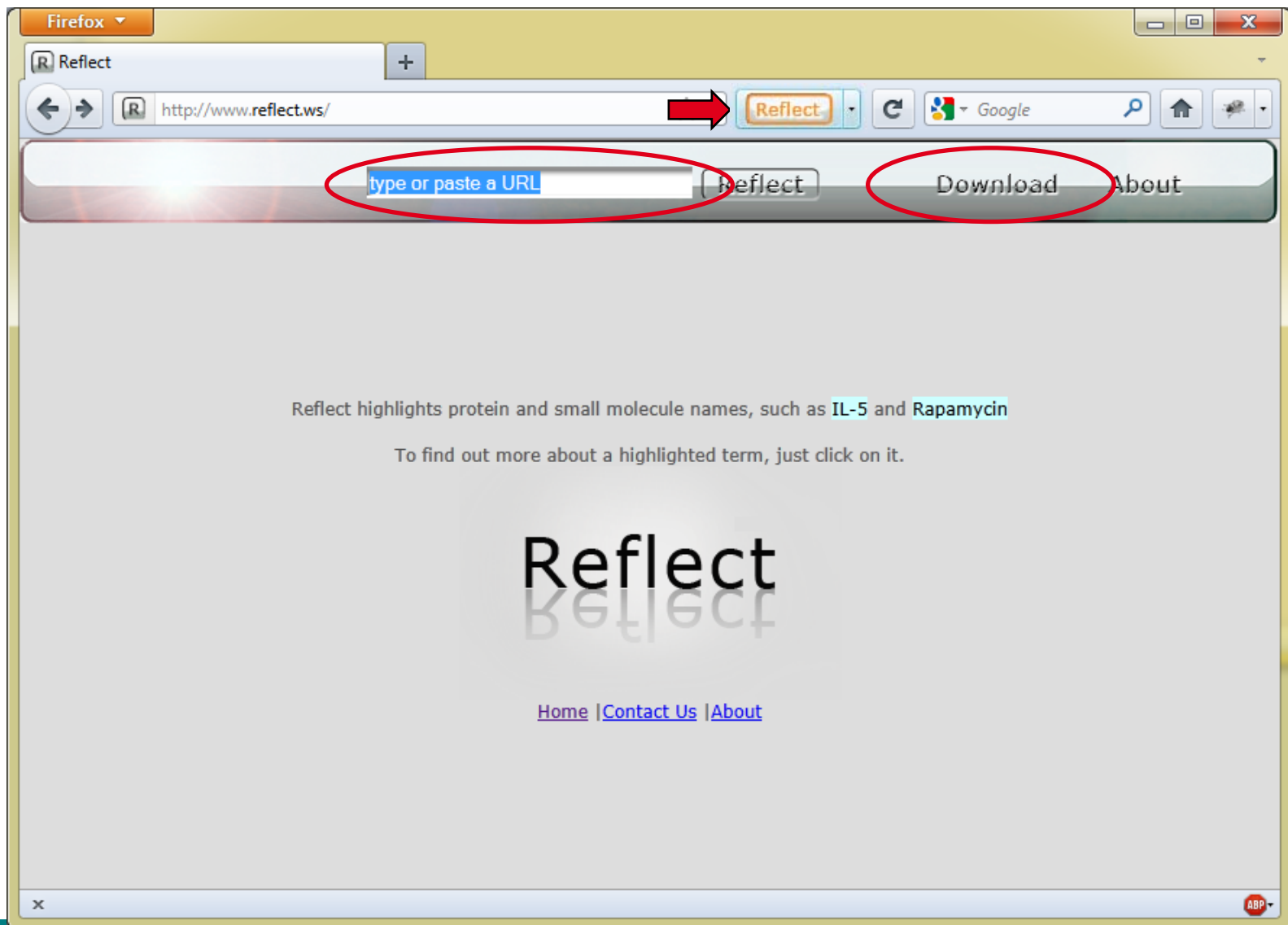


## Design criteria for Reflect

Keep it simple

Interactive

www.reflect.ws



# Reflect in action

The screenshot shows a Firefox browser window displaying a Nature journal article. The article title is "A Raf-induced allosteric transition of MEK". The authors are Damian F. Brennan, Arvin C. Dar, Nicholas T. Hertz, William C. Burlingame, Kevan M. Shokat & David Barford. The article is from Nature 472, 366–369 (21 April 2011). A Reflect pop-up window is open over the article, showing details for the protein Map3k2 (ENSMUSP00000025242) from M. musculus. The pop-up includes a protein diagram, a sequence viewer showing the sequence MDDQQALNS IMQDLAVLHPVPGQHYLYKKPGKQNLH HQKNRMFESNLN, and a description: "mitogen activated protein kinase kinase kinase 2; Component of a protein kinase signal transduction cascade. Regulates the JNK and".

Firefox

A Raf-induced allosteric transition of KS...

http://www.nature.com/nature/journal/v472/n7343/full/nature09860.html

Reflect

Google

nature International weekly journal of science

Full text access provided to EMBL by Szilard Library

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NATURE | LETTER

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A Raf-induced allosteric transition of MEK

Damian F. Brennan, Arvin C. Dar, Nicholas T. Hertz, William C. Burlingame, Kevan M. Shokat & David Barford

Affiliations | Contributions | Corresponding authors

Nature 472, 366–369 (21 April 2011) | doi:10.1038/nature09860

Received 04 June 2010 | Accepted 20 January 2011 | Published 2011

In metazoans, the Ras–Raf–MEK (mitogen-activated protein-kinase kinase)–ERK (extracellular signal-regulated kinase) signalling pathway relays

Reflect - MEK

Protein Chemical Wikipedia Add About

Map3k2 (ENSMUSP00000025242) M. musculus Edit

MEKK2; MAP3K2; MAPK/ERK kinase kinase 2

M3K2\_MOUSE, Sequence, Domains, Structure, Locus, Literature

MDDQQALNS IMQDLAVLHPVPGQHYLYKKPGKQNLH HQKNRMFESNLN

mitogen activated protein kinase kinase kinase 2; Component of a protein kinase signal transduction cascade. Regulates the JNK and

Matched terms

Genomic location  
In [ENSEMBL](#)

Related Medline  
Abstracts in [iHOP](#)

Organism(s)

Sequence  
identifier(s)

Synonyms

Domains  
in [SMART](#)

Draggable  
Sequence  
window

Edit synonyms  
or description

Domains –  
mouse  
over to  
show name

Sequence  
Scroll bars

Protein  
description

Representative  
3D structure in [PDBsum](#)

Major interaction  
Partners in [STITCH](#)

Green indicates  
Known subcellular location

Organism

Protein Wikipedia Add About

TP53 (ENSP00000269305) H. sapiens

p53; p53 tumor suppressor; tumor suppressor p53; Trp53; Mutant p53; ...

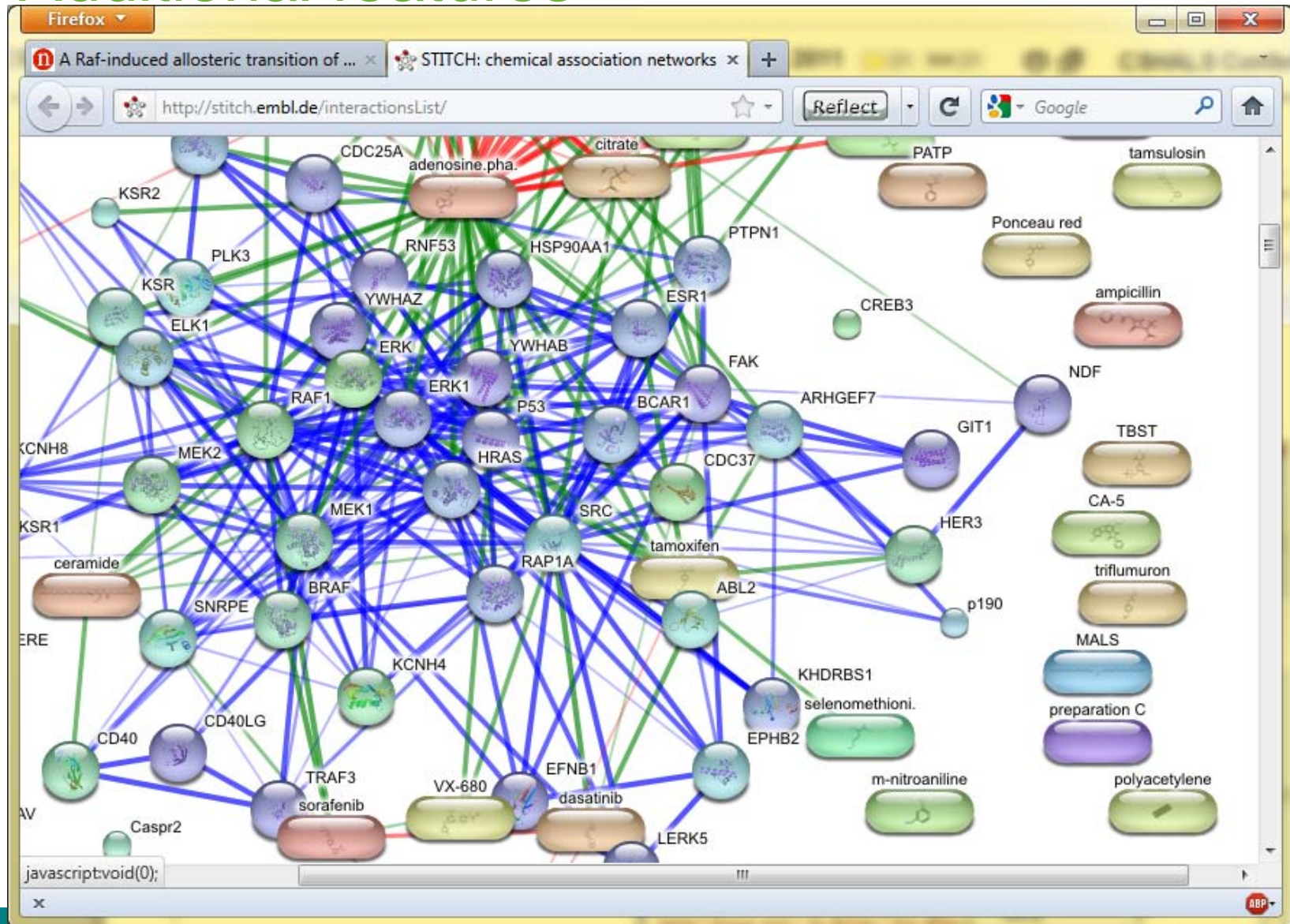
P04637, Sequence, Domains, Structure, Locus, Literature

KLLPENNVLSPLPSQAMDDLMLSPDDIEQWFTEDFGPDEAPRMPEAAP...

Acts as a tumor suppressor in many tumor types; induces growth arrest or apoptosis depending on physiological circumstances and cell...



# Additional features



# Additional features

The screenshot shows a Firefox browser window with two tabs. The active tab is titled "STITCH: chemical association networks" and displays a Nature article page. The article title is "A Raf-induced allosteric transition of ...". The URL is "http://www.nature.com/nature/journal/v472/n7343/full/nature09860.html". The article is from Nature 472, 366–369 (21 April 2011), doi:10.1038/nature09860. It was received on 04 June 2010, accepted on 20 January 2011, and published online on 27 March 2011.

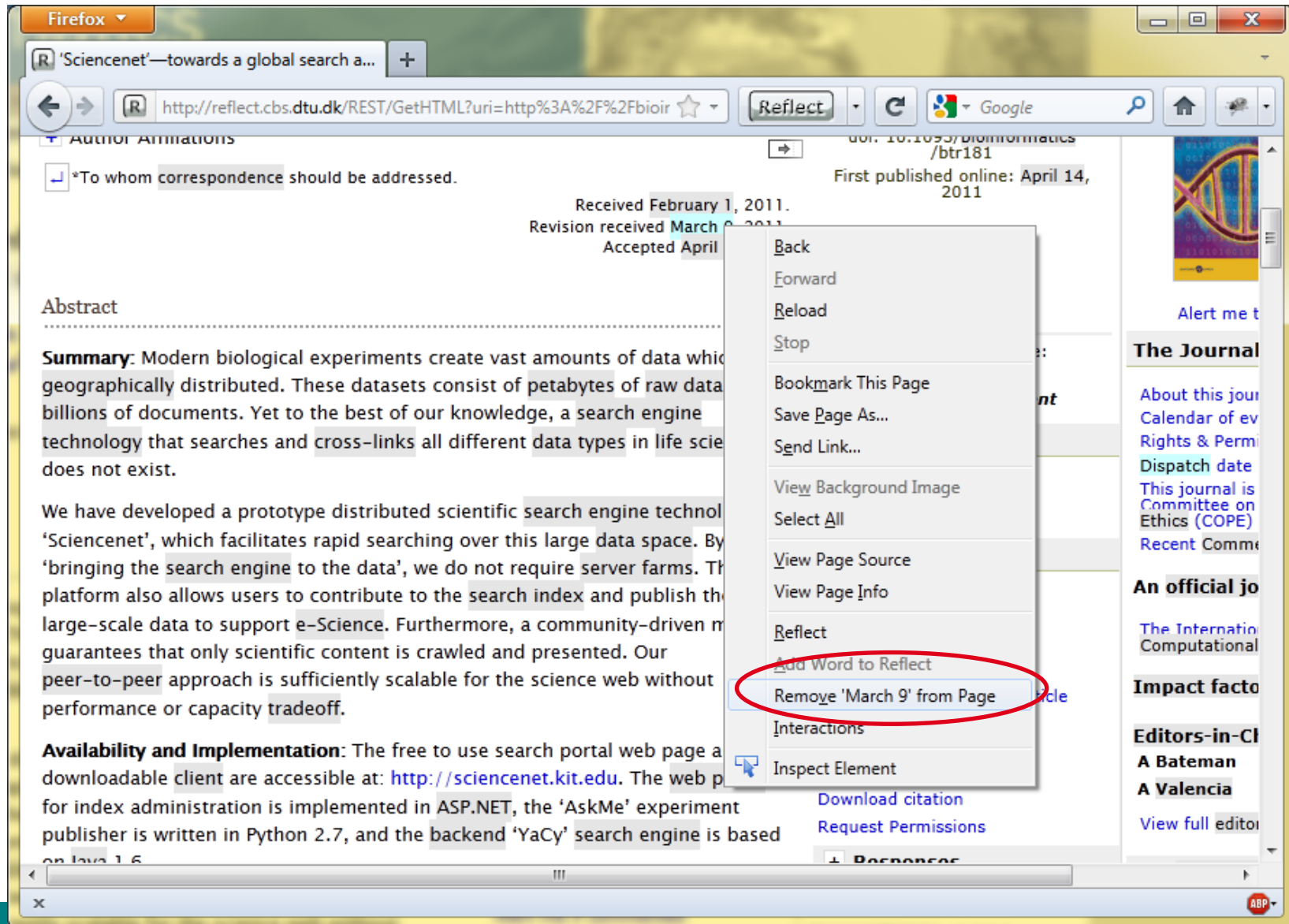
The article text discusses the Ras–Raf–MEK (mitogen-activated protein-kinase kinase)–ERK (extracellular signal-regulated kinase) signalling pathway. It mentions that in metazoans, this pathway is important in the regulation of cell proliferation and is often aberrantly activated in cancer. KSR (kinase suppressor of RAS) is essential for RAS.

An "Editor's summary" box on the right states: "Allostery in kinase suppressor of RAS. The RAS–RAF–MEK–ERK signalling pathway is important in the regulation of cell proliferation and is often aberrantly activated in cancer. KSR (kinase suppressor of RAS) is essential for RAS".

A modal window titled "ERK" is overlaid on the article text. It contains the following fields:

- Add "ERK" as a:
- Type: Protein Synonym (dropdown menu)
- Organism: homo sapiens (text field)
- Identifier or Name: ERK (text field)
- Matches:
  - ☐ ENSP00000363761
  - ☐ ENSP00000215832
- Add to Reflect (button)

# Additional features





# Examples for API calls

Firefox

ScienceDirect - Cell : Hallmarks of Cance... +

http://www.sciencedirect.com/science/article/pii/S0092867411001279

Reflect metazoans

genetic diversity that expedites their acquisition, and inflammation, which fosters  
rk functions. Conceptual progress in the last decade has added two emerging  
potential generality to this list—reprogramming of energy metabolism and evading  
ction. In addition to cancer cells, tumors exhibit another dimension of complexity: they  
toire of recruited, ostensibly normal cells that contribute to the acquisition of hallmark  
g the “tumor microenvironment.” Recognition of the widespread applicability of these  
creasingly affect the development of new means to treat human cancer.

ne

abilities—Conceptual Progress  
ng Proliferative Signaling  
omatic Mutations Activate Additional Downstream Pathways  
ruptions of Negative-Feedback Mechanisms that Attenuate Proliferative Signaling  
cessive Proliferative Signaling Can Trigger Cell Senescence

with Suppressors  
Contact Inhibition and Its Evasion Corruption of the TGF- $\beta$  Pathway Promotes

ll Death  
diates Both Tumor Cell Survival and Death Necrosis Has Proinflammatory and Tumor-  
ential

licative Immortality  
eplicative Senescence Delayed Activation of Telomerase May Both Limit and Foster  
gression New Functions of Telomerase

Reflect - Network

Human

About Reflect

Click here to open network in STITCH

Reflect - Proteins

Human

About Reflect

- + SLC22A3; extraneuronal monoamine trans...
- ITK; Itk; EMT; LYK; T-cell-specific kinase
- + TP53; p53; p53 tumor suppressor; tumor su...
- + VEGFA; vascular endothelial growth factor; ..

# Technical parts – the back-end

- Main parts: Tagging server and Queuing server
- Some statistics after 5,5 Gb of RAM usage

	Proteins	Chemicals	Wikipedia
Entities	2,634,843	7,420,623	3,358,653
Names	20,673,223	24,251,406	7,611,364

- Tagging speed

	Tagging time in seconds
Full scientific paper (~ 10,000 words)	0.3 s
Typical web page (<1,000 words)	0.075 s

- Tagging is usually faster than the data transfer

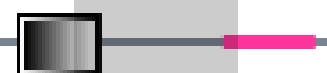
# Mock-up screenshot of Reflect

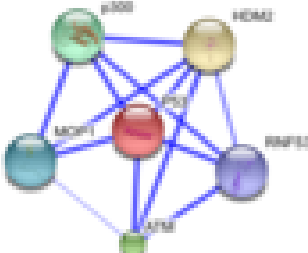

- Subcellular localization

[Protein](#) [Wikipedia](#) [Add](#) [About](#)

TP53 ([ENSP00000269305](#)) H. sapiens [Edit](#)

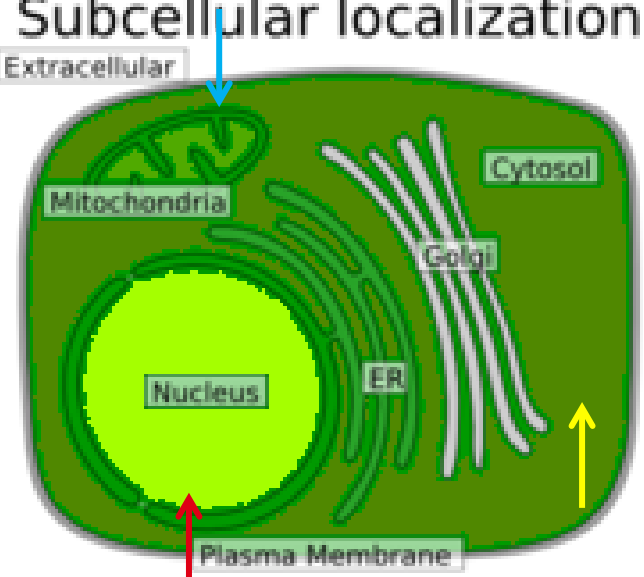
p53; p53 tumor suppressor; tumor su  
[P04637](#), [Sequence](#), [Domains](#), [Structure](#)

  
KLLPENNVLSPLPSQAMDDLMLSPD



Acts as a tumor suppressor in many t  
arrest or apoptosis depending on phy

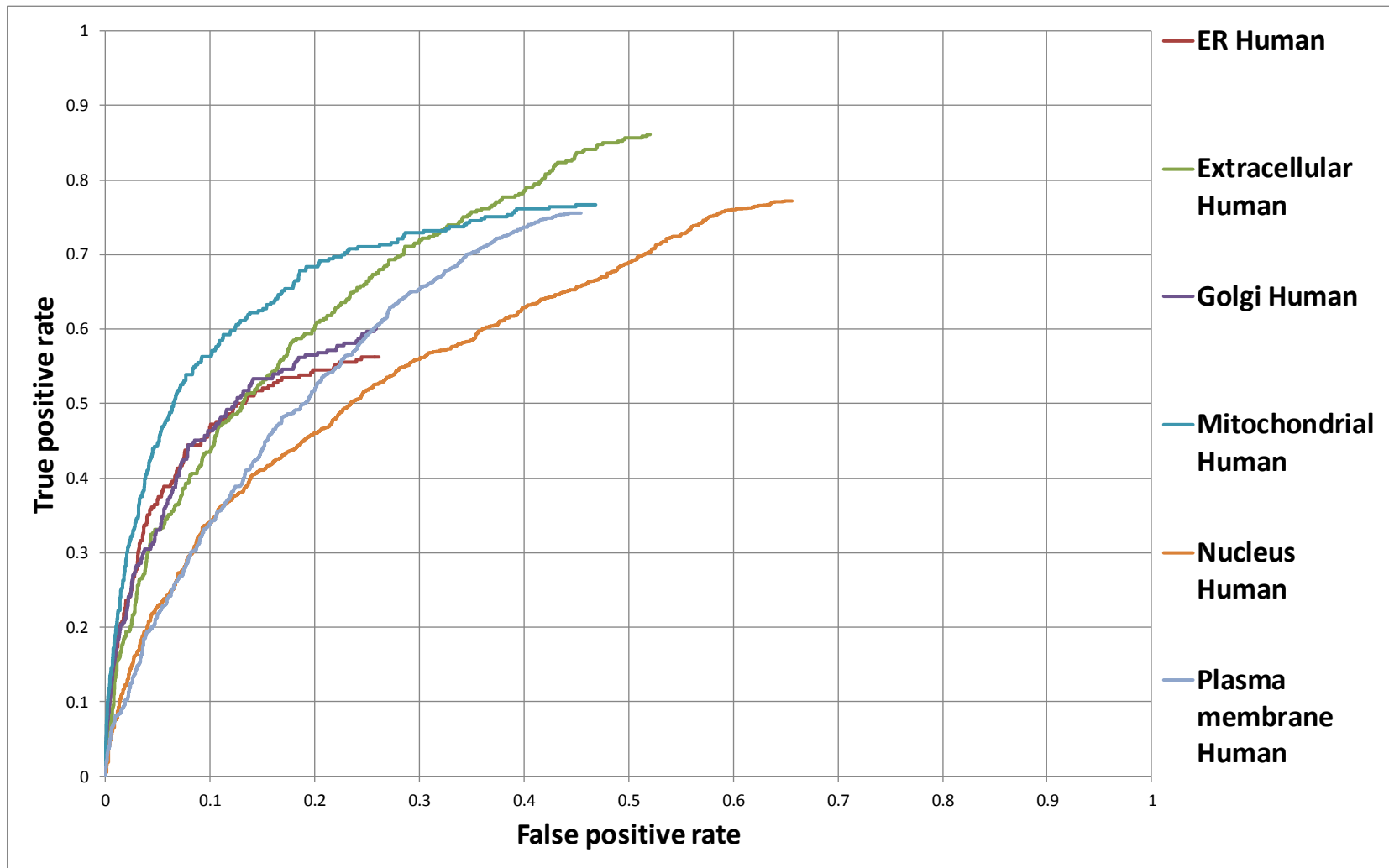
### Subcellular localization



# Subcellular localization - Pipeline



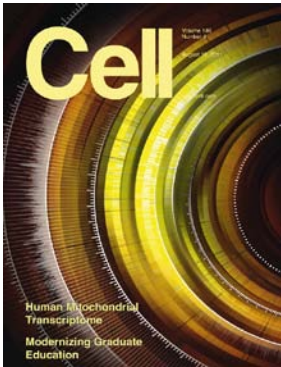
# Receiver operating characteristic plot





# Projects using Reflect

- OnTheFly: <http://onthefly.embl.de>
- Reflect Gadgets: <http://www.sciencedirect.com>
- Article of the Future: <http://www.cell.com>
- ScienceNet: <http://sciencenet.kit.edu>



- Reflect browser plugins: <http://www.reflect.ws>
- Reflect API: <http://bit.ly/reflectapi>
- Contact: [contact@reflect.ws](mailto:contact@reflect.ws)

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