

A glowing blue wireframe brain is centered in the image, set against a background of a DNA double helix. The brain's surface is composed of a grid of lines, and it emits a bright blue light. The DNA helix is also rendered in a glowing blue wireframe style, winding across the background.

Depression and *PER2*

Andie Held

What gets you down in the dumps?



<http://www.desibucket.com/db/02/25158/25158.jpg>

What is depression?



Low mood and sadness that interferes with daily life

Affects 6.7% of the adult population in the U.S.

Attributable to genetic, biological, environmental, and psychological factors

PER2, Who?

PAS_11

Period_C

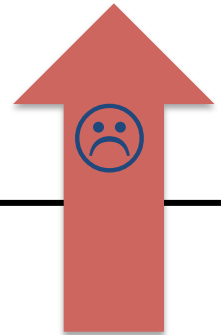
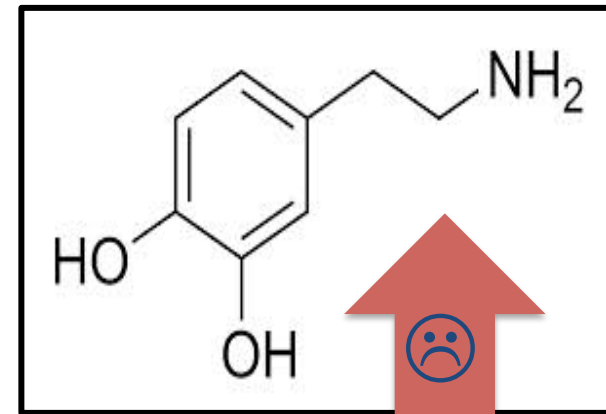
Protein from Pfam



Light reception
Regulation of circadian
rhythm



Always found C-
terminal to PAS

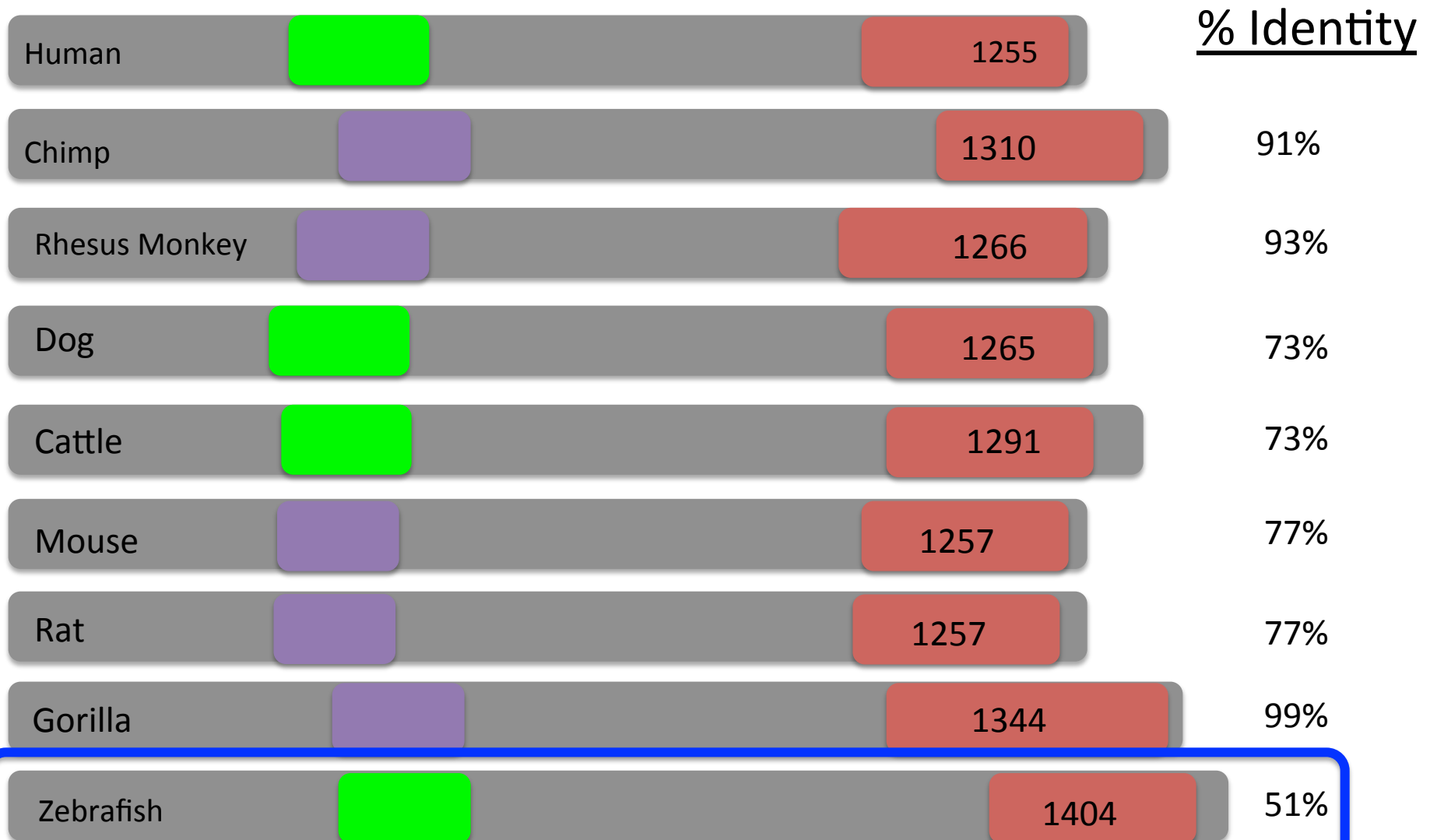


http://www.huffingtonpost.com/dr-susan-taylor/can-race-possibly-influen_b_1914649.html;

[http://2.bp.blogspot.com/-Ph9jPyaTtSs/UGiFJIAiECI/AAAAAAAAAlc/7FGx6NV4LSc/s1600/Day And Night for draw.jpeg](http://2.bp.blogspot.com/-Ph9jPyaTtSs/UGiFJIAiECI/AAAAAAAAAlc/7FGx6NV4LSc/s1600/Day%20And%20Night%20for%20draw.jpeg);

http://assets.openstudy.com/updates/attachments/513c2f1ae4b01c4790d24e4d-easyuser-1362926137205-dopamine_chemical_structure.png

How well conserved is PER2?



How well conserved is PER2?



Phylogram from Clustal Omega

Are there natural remedies for depression?

Valerian Root



Primary goal

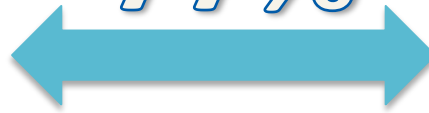
The primary goal of this study is to determine how the light/dark cycle affects dopamine receptor expression as well as how natural products such as valerian affect gene expression

Which model organisms should we use to study depression?

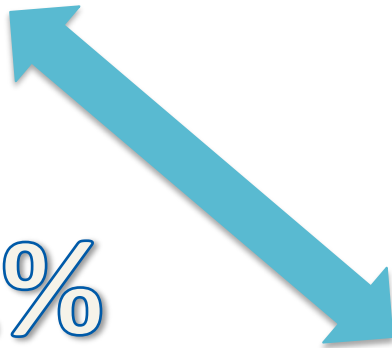


Standard circadian model

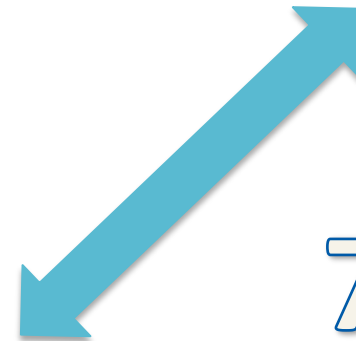
77%



51%



72%



Similarity percents determined by BLAST

Aim 1: How well conserved is PER2 in blind cavefish?

PAS_11

Human	TVEEMESVTSEHIVKNADMFAVAVSLVSGKILYISDQVASIFHCKRDAFSDAKFVEFLAP	233
Zebrafish	TIEEIDSITSEYTLKNTDIFAVAVSLITGKIVYISDQAASILNCKRDVFNKAKFVEFLTP	299
Cavefish	-----ISDQAAGILHCKKDEFKDRKFVEFLTP	27
	****.*.*:.*:* *. : *****:*	
Human	HDVGVFHSFTSPYKLPWSMCSGADSFTQECMEEKSFFCRVSVRKSHENEIRYHPFRMTP	293
Zebrafish	QDVSVFYSFTTPYRLPSWSMCTGADSSPSDCMQEKSFFCRISGGKECEADLQYYPFRMTP	359
Cavefish	QDVSVFYSFTTPYRLPAWSMCTGAESSSTEFMQEKSFFCRISGGKEKDGGLQYYPFRMTP	87
	:**.*:*:*:*:*:* *:*:*:* : *:*:*:*:*:* * . : :*:*****	
Human	YLVKVRDQQGAESQLCCLLLAERVHSGYEAPRIPPEKRIFTTHTPNCLFQDVDERAVPL	353
Zebrafish	YLMKVQDVEHSEDQFCCLLLAERVHSGYEAPRIPTDKRIFTTHTPSCVFDVDERAVPL	419
Cavefish	YLMKVQDAELSEEHFCLLILAERVHSGYEAPRIPDKRIFTTHTPNCMFQDVDERAVPL	147
	:*:* : :*.:*:***:***** :*****.*:*****	
Human	LGYPQDLIETPVVLVQLHPSDRPLMLAIHKKILQSGGQPFDYSPIRFRANGHEYITLDT	413
Zebrafish	LGYPQDLIGTPVLLHLHPNDRPTMLGIHRKILQCAGQPFDH-SIRFCARNGEYITIDTS	478
Cavefish	LGYPQDLIGTPV-----	160
	***** **	

Alignments courtesy of Clustal Omega

Aim 2: How are PER2 and D2 dopamine receptors expressed in light/dark environments in species with different eye structures?

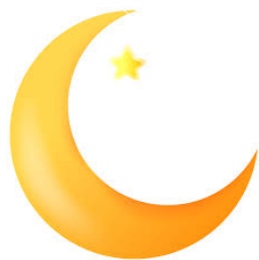


RNA-seq



PER2 ↑

DopR ↓



PER2 ↓

DopR ↑



RNA-seq



PER2 —

DopR —



PER2 —

DopR —

Aim 3: How does valerian root affect
PER2 protein expression?



Label free
quantification;
Mass spectrometry



Normal
Behavior

Relaxed
behavior

DopR

DopR



Label free
quantification;
Mass spectrometry



Stillness
and hiding

Semi relief
of stillness
& hiding

DopR

DopR

Homologs and flowchart picture references

- Proteins on slide 6 are curtesy of Homologene
- Sun <http://www.clipartbest.com/cliparts/9cz/EMK/9czEMKnKi.gif>
- Moon <http://bestclipartblog.com/clipart-pics/moon-clip-art-11.gif>
- Fish
<http://www.clker.com/cliparts/r/C/E/Y/M/x/simple-fish-md.png>
- Fish Food
http://i.walmartimages.com/i/p/00/04/67/98/77/0004679877035_500X500.jpg
- Valerian root
<http://www.herbaextractsplus.com/images/herbs/valerian-isp.jpg>
- Brain
http://static.freepik.com/free-photo/cartoon-brain-outline-clip-art_411969.jpg

Future Directions

Genetics:

- Further investigate the role of dopamine in depression and other natural products that regulate it
- Duplicate specific aim experiments with the addition of depression trigger events

Social Work:

- Educate the public to help fight the mental illness stigma
- Advocate for equal access to mental health care

Resources



<http://www.dbsalliance.org/site/PageServer?pagename=home;>

[http://www.nami.org/Content/NavigationMenu/Campaign for the Mind of America/Mental Illness Awareness Week/MIAW-sticker-circle-2.5.jpg;](http://www.nami.org/Content/NavigationMenu/Campaign%20for%20the%20Mind%20of%20America/Mental%20Illness%20Awareness%20Week/MIAW-sticker-circle-2.5.jpg)

<http://www.suicidepreventionlifeline.org/>

Questions?

positive bunny post ¹



chibird