Eat or not? The feeding choices of *Drosophila*

Su XB   Xing LM   PQL

2019-05-31


很饱
很满意！

Outline

- Food preference of *Drosophila.*

  —Su XB

- Key satiety signals that regulate feeding cessation in *Drosophila*

  —Xing LM

- Dietary modulation of different behaviors.

  —PQL

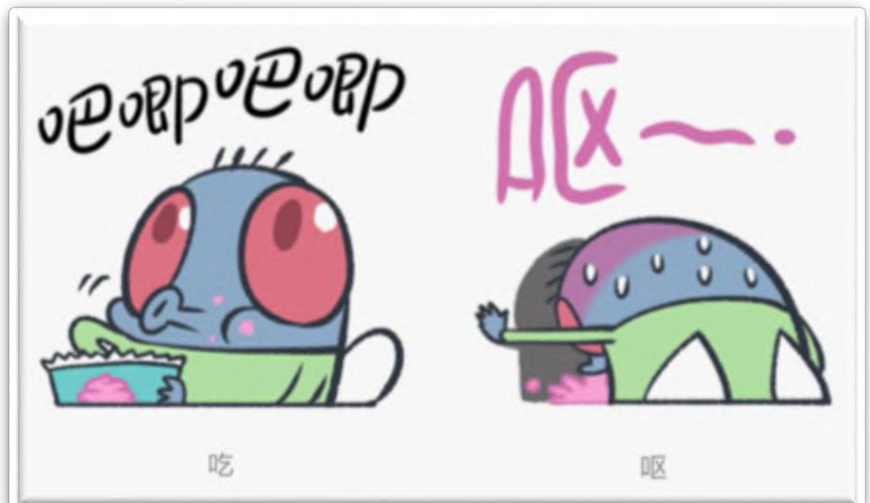
- Discussion

Food preference of *Drosophila*

Su XB

Food preference of *Drosophila*

How does fruit flies perceive and choose food?



Food preference of *Drosophila*

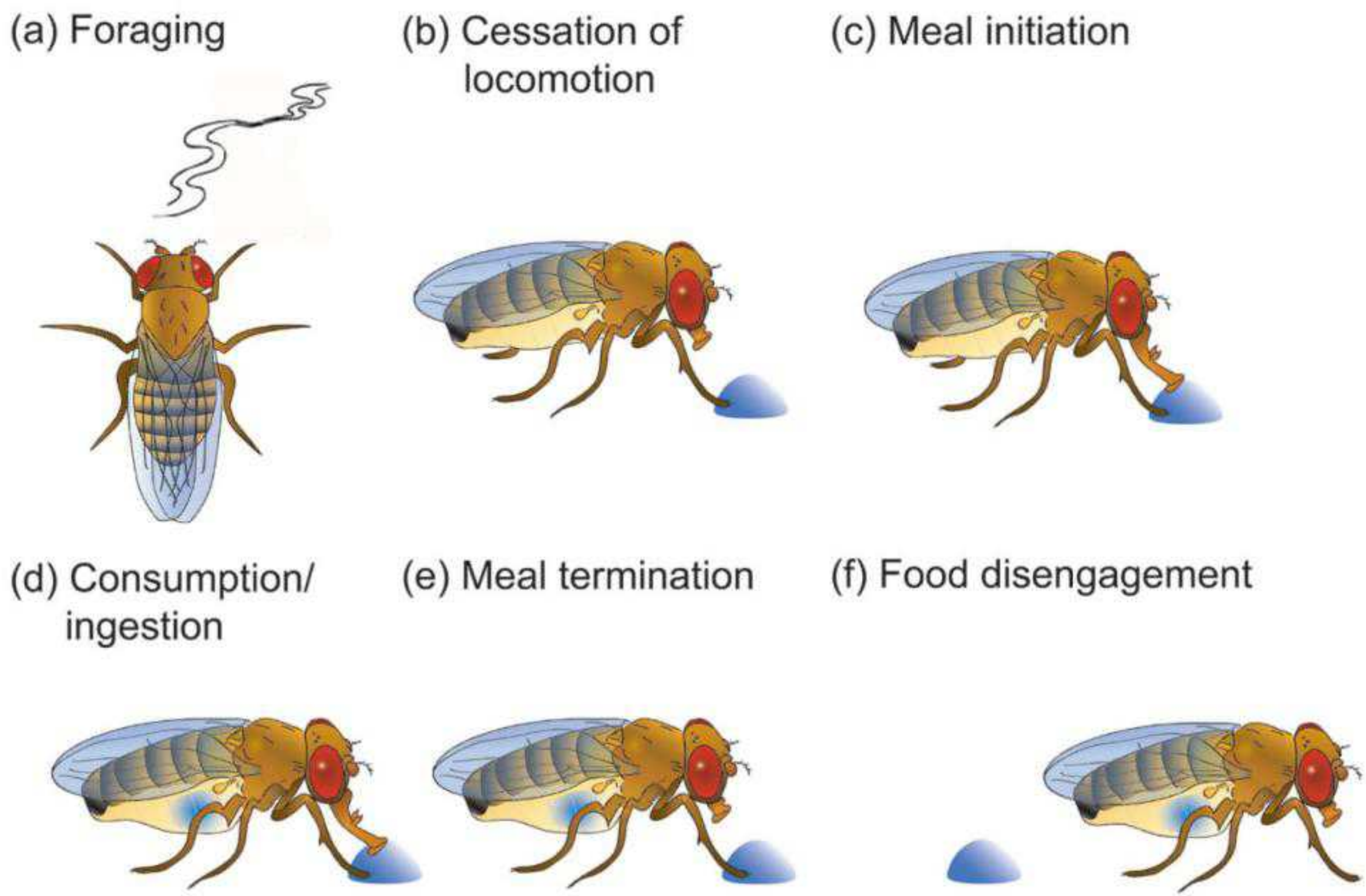
1, Overview of regulation of feeding behavior in *drosophila.*

2, The attractiveness of food-odor to *drosophila.*

3, Taste preferences of *Drosophila*.

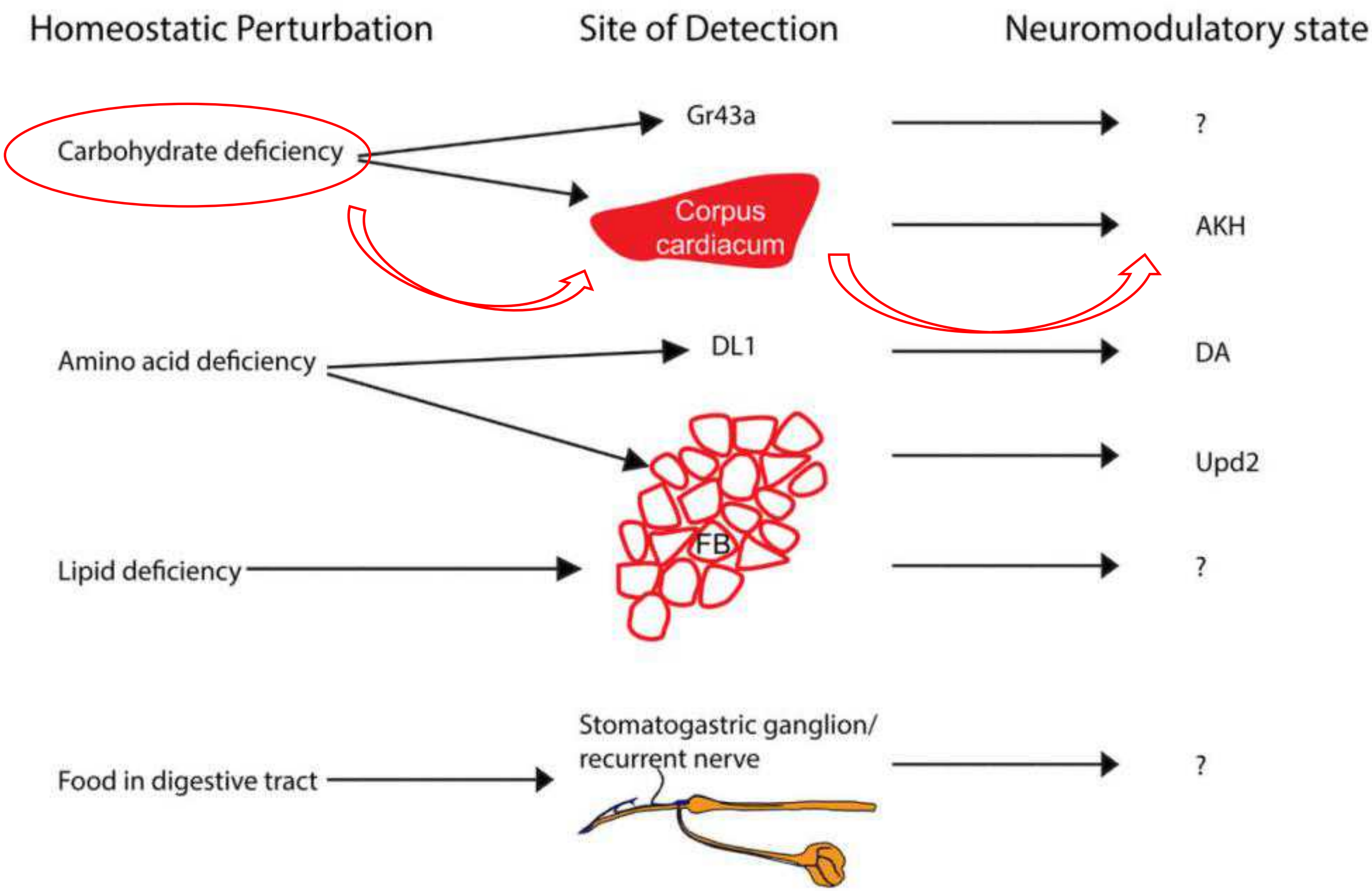
1 Overview of regulation of feeding behavior

Modules in the feeding behavioral repertoire in *Drosophila melanogaster*



Allan-Hermann Pool and Kristin Scott. Curr Opin Neurobiol. 2014

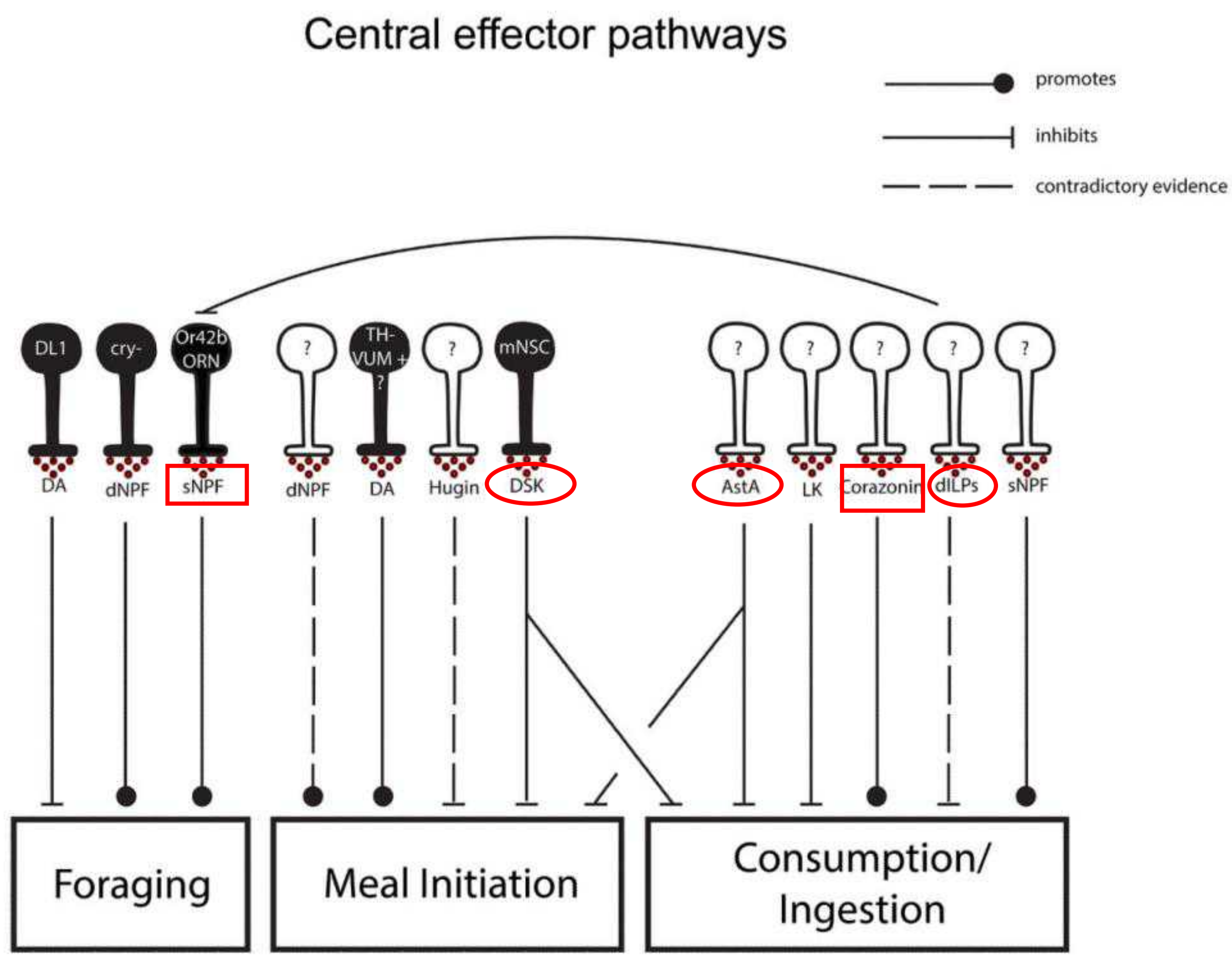
Nutritional status is converted into neuromodulatory states



Allan-Hermann Pool and Kristin Scott. Curr Opin Neurobiol. 2014

Overview of regulation of feeding behavior

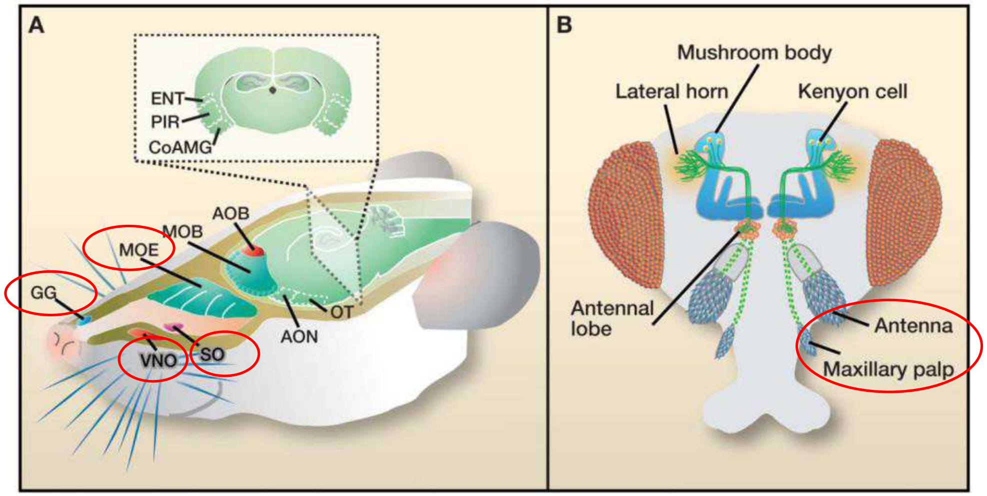
Central neuromodulatory systems that regulate individual feeding modules

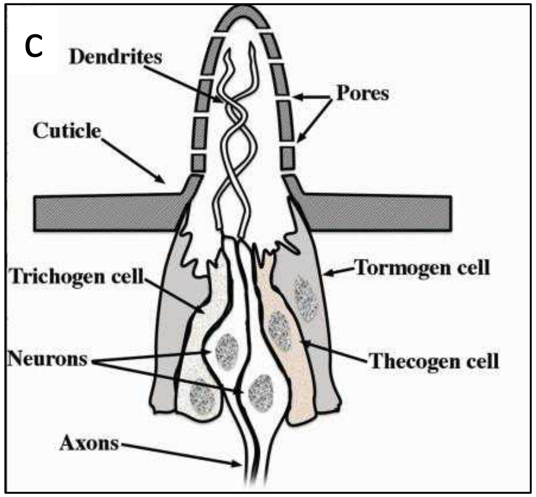


Allan-Hermann Pool and Kristin Scott. Curr Opin Neurobiol. 2014

The attractiveness of food-odor to *drosophila*

Olfactory Perception





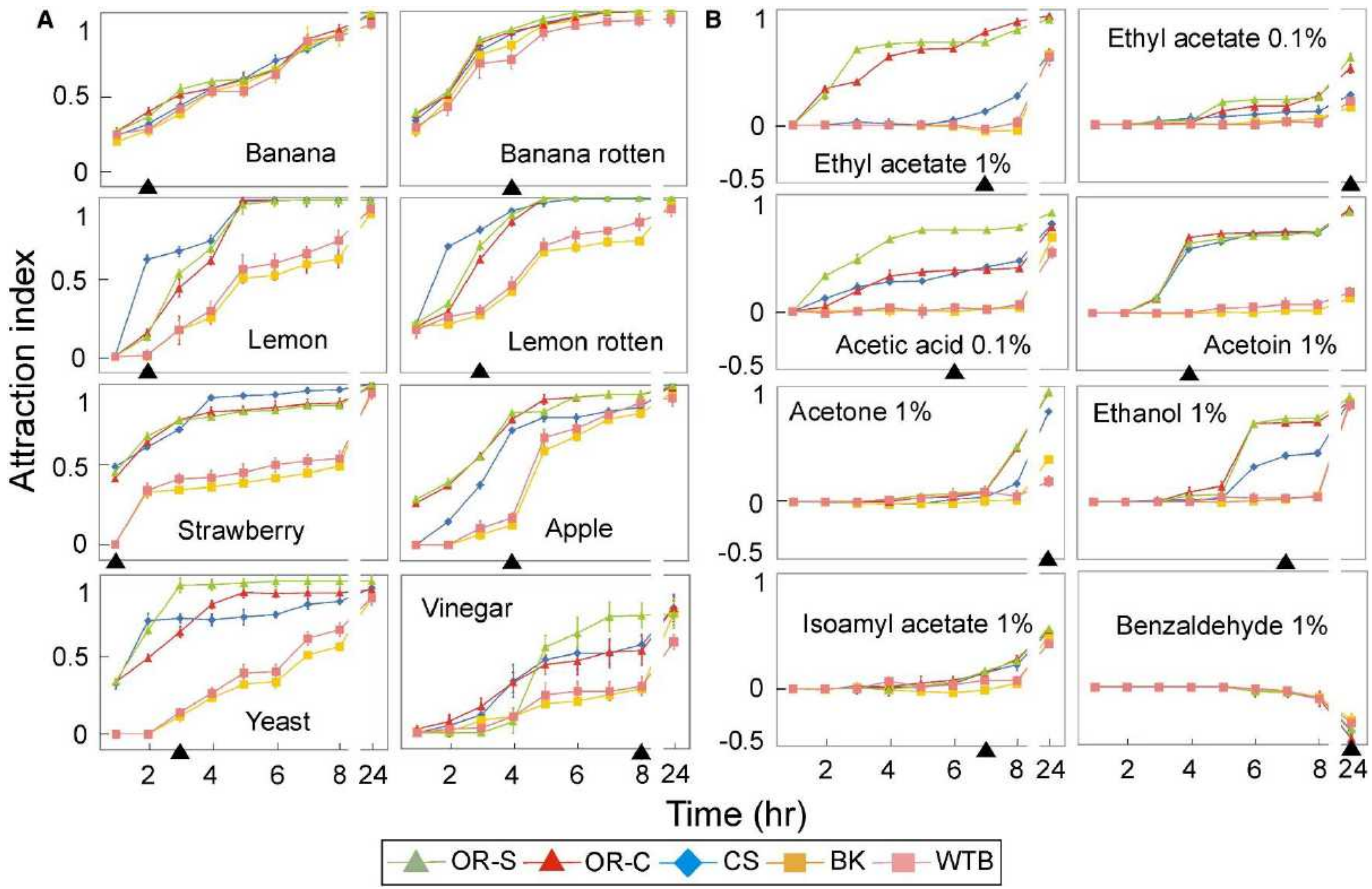
(A) Sagittal view of a rodent head, showing four olfactory organs.
(B) Frontal view of a *Drosophila* head.
(C) Structure and components of typical sensilla.

Su CY et al. Cell. 2009

Martin F et al. Anat Rec (Hoboken). 2013

The attractiveness of food-odor to *drosophila*

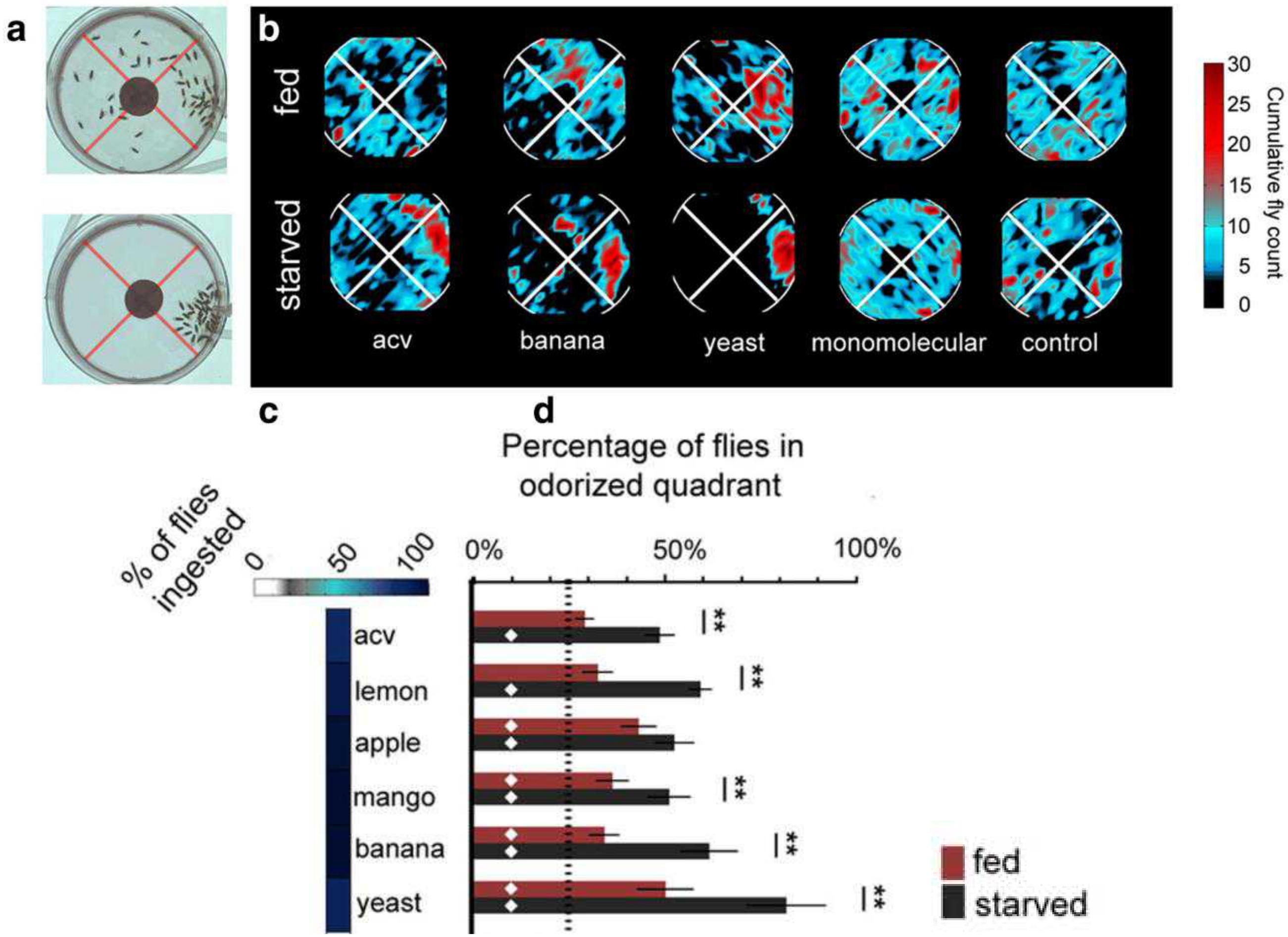
Response of Five Classical Wild-Type Strains to Selected Natural and Synthetic Stimuli



Agnieszka Ruebenbauer. et al. Current Biology. 2008

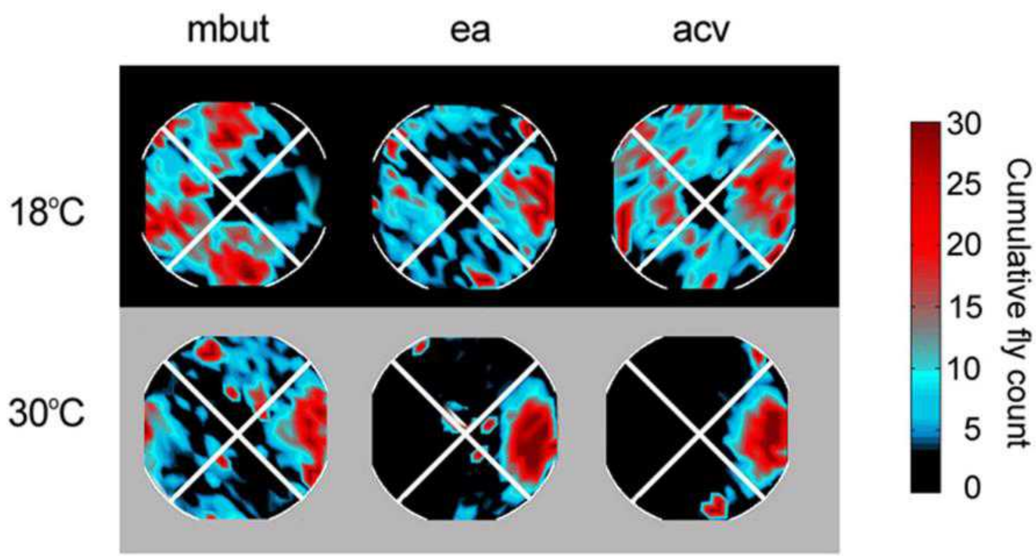
2 The attractiveness of food-odor to *drosophila*

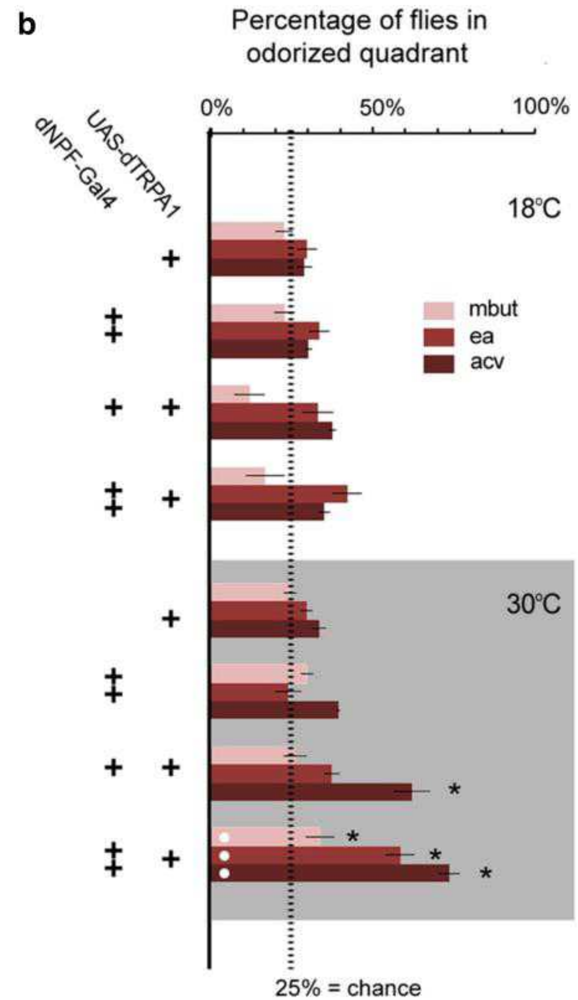
vinegar (acv)



Jennifer Beshel and Yi Zhong. J Neurosci. 2013

Activating the dNPF neuron is sufficient to produce odor attraction

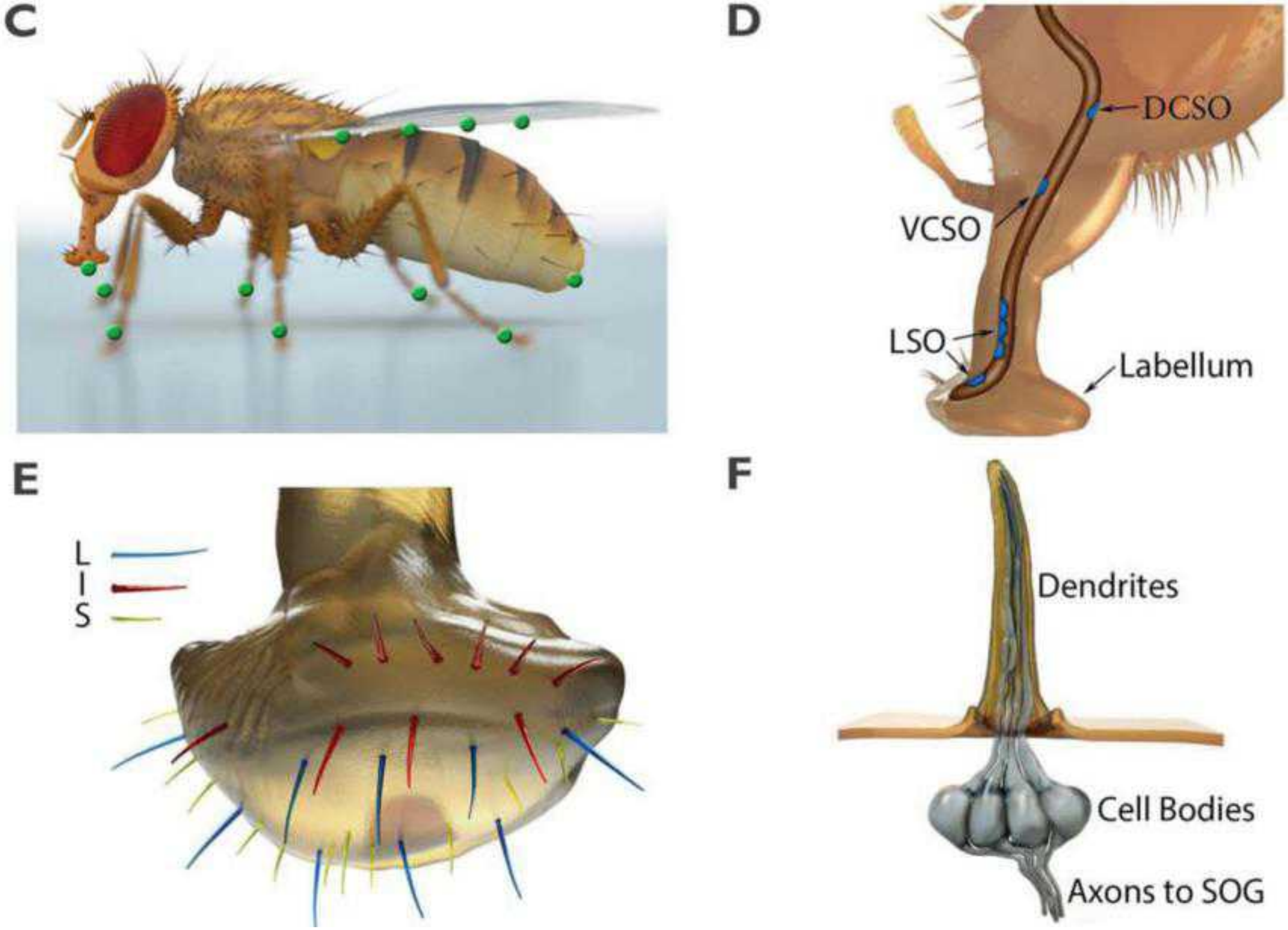




Jennifer Beshel and Yi Zhong. J Neurosci. 2013

3 Taste preferences of *Drosophila*.

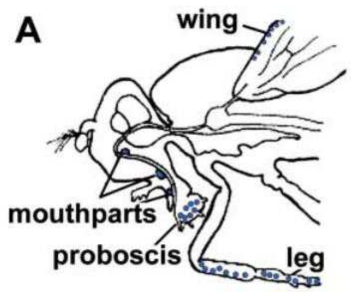
Gustatory sensilla in adult flies



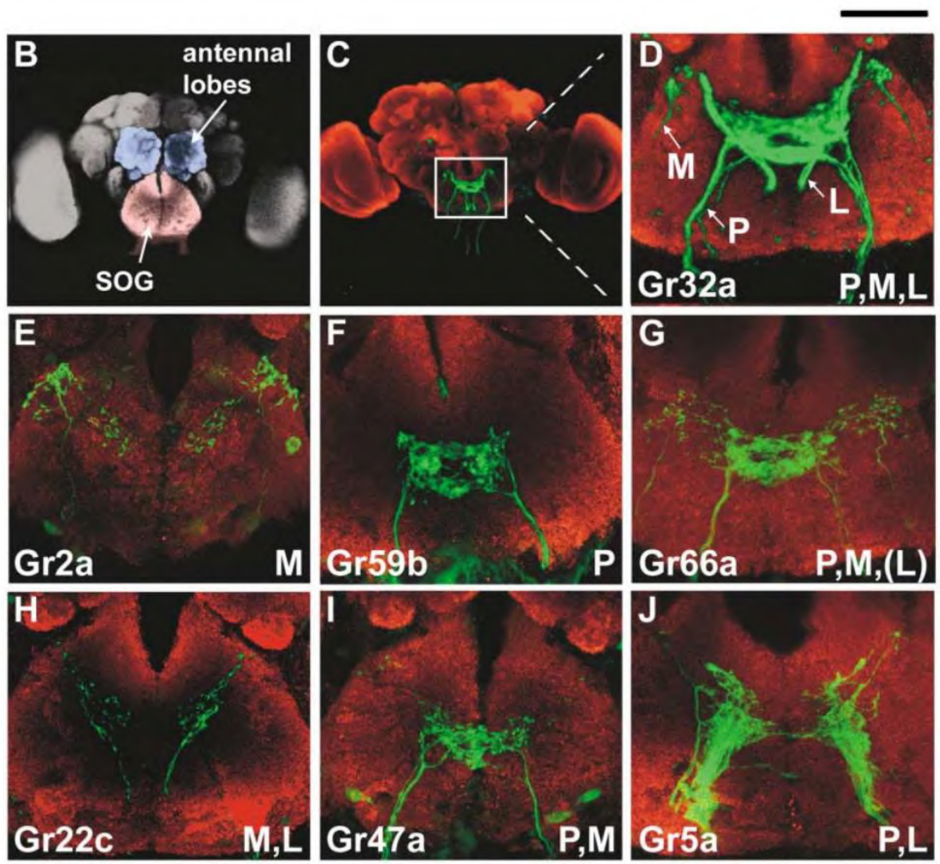
Emily R. Liman et al. *Neuron*. 2014

3 Taste preferences of *Drosophila*.

Taste Projections in the SOG



	proboscis	mouth	leg
Gr2a		√	-
Gr5a	√	-	√
Gr22c	-	√	√
Gr32a	√	√	√
Gr47a	√	√	-
Gr59b	√	-	-
Gr66a	√	√	(√)



Zuoren Wang, *Cell*, (2004)

Neuron
Volume 56, Issue 3, 8 November 2007, Pages 503-516

Article

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Current Biology
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Current Biology
Volume 18, Issue 22, 25 November 2008, Pages 1797-1801

Report

Gr64f Is Required in Combination with Other

G

D

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PNAS

A *Drosophila* gustatory receptor required for the responses to sucrose, glucose, and maltose identified by mRNA tagging

Yuchen Jiao, Seok Jun Moon, and Craig Montell*

Departments of Biological Chemistry and Neuroscience, Center for Sensory Biology, Johns Hopkins University School of Medicine, Baltimore, MD 21205

Edited by Kathryn V. Anderson, Sloan–Kettering Institute, New York, NY, and approved July 20, 2007 (received for review March 15, 2007)

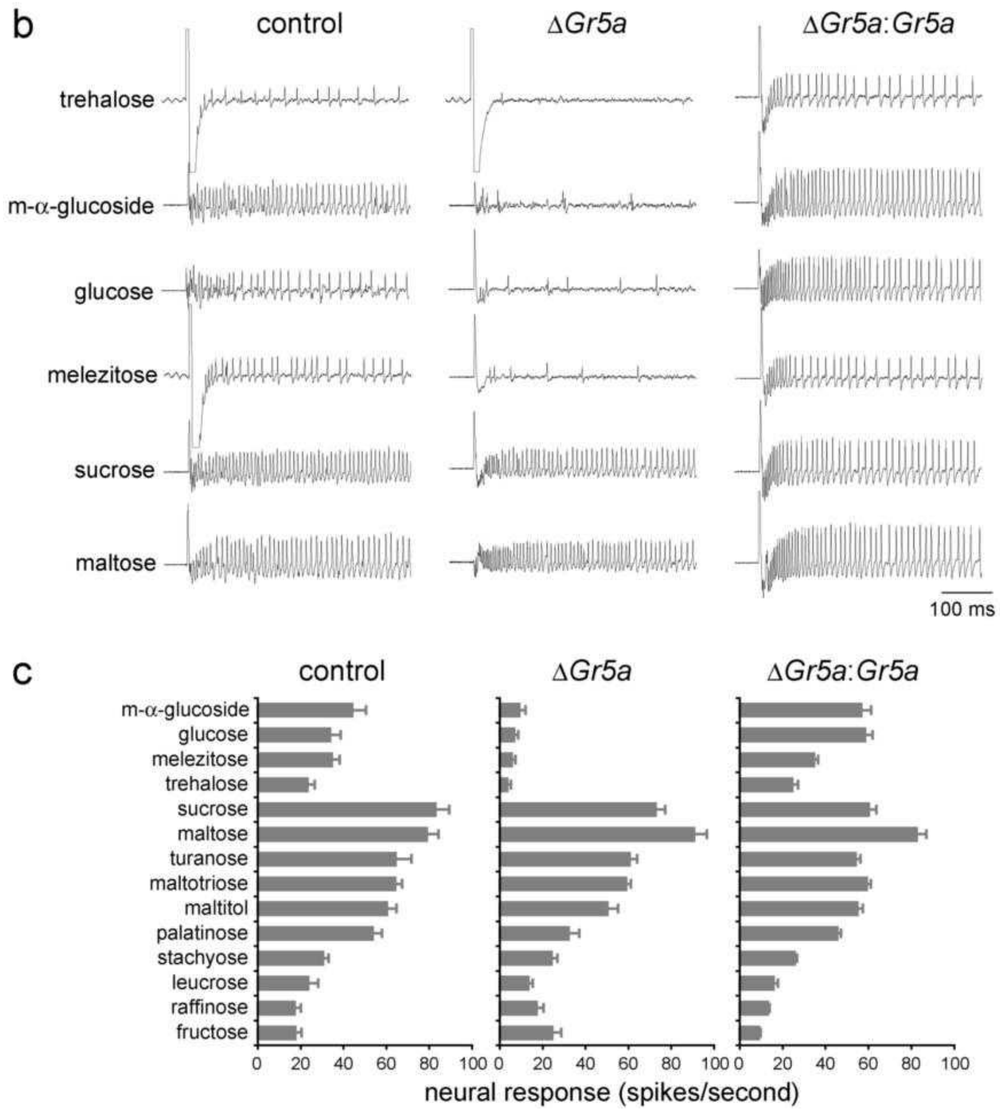
3 Taste preferences of *Drosophila*.

sensing the sweet taste of sugars

Sub-family of eight sugar receptor genes Gr5a, Gr61a and Gr64a-f expressed in 'sweet' neurons of each sensilla are involved in sensing the sweet taste of sugars

3 Taste preferences of *Drosophila*.

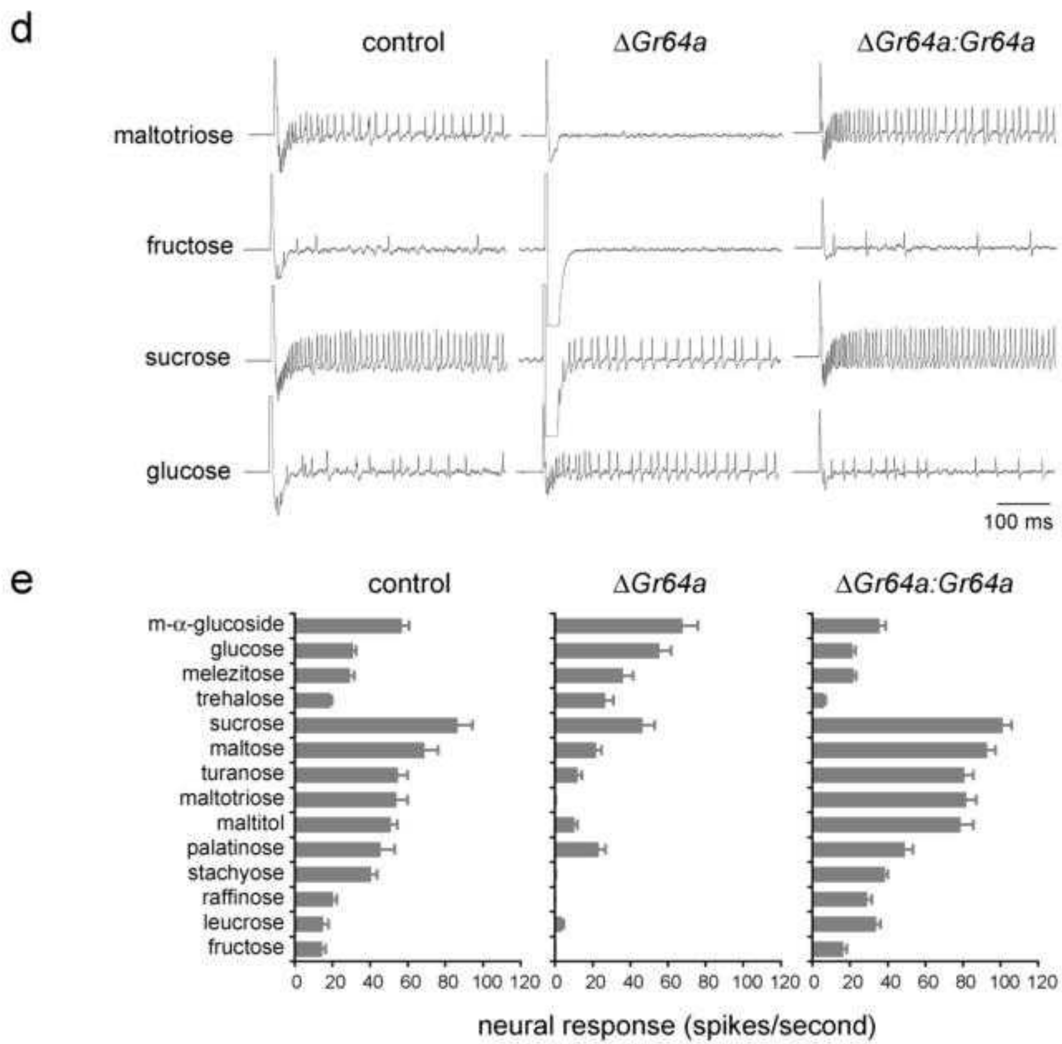
The trehalose receptor, Gr5a, mediates responses to several sugars



Dahanukar A et al. Neuron. 2007

3 Taste preferences of *Drosophila*.

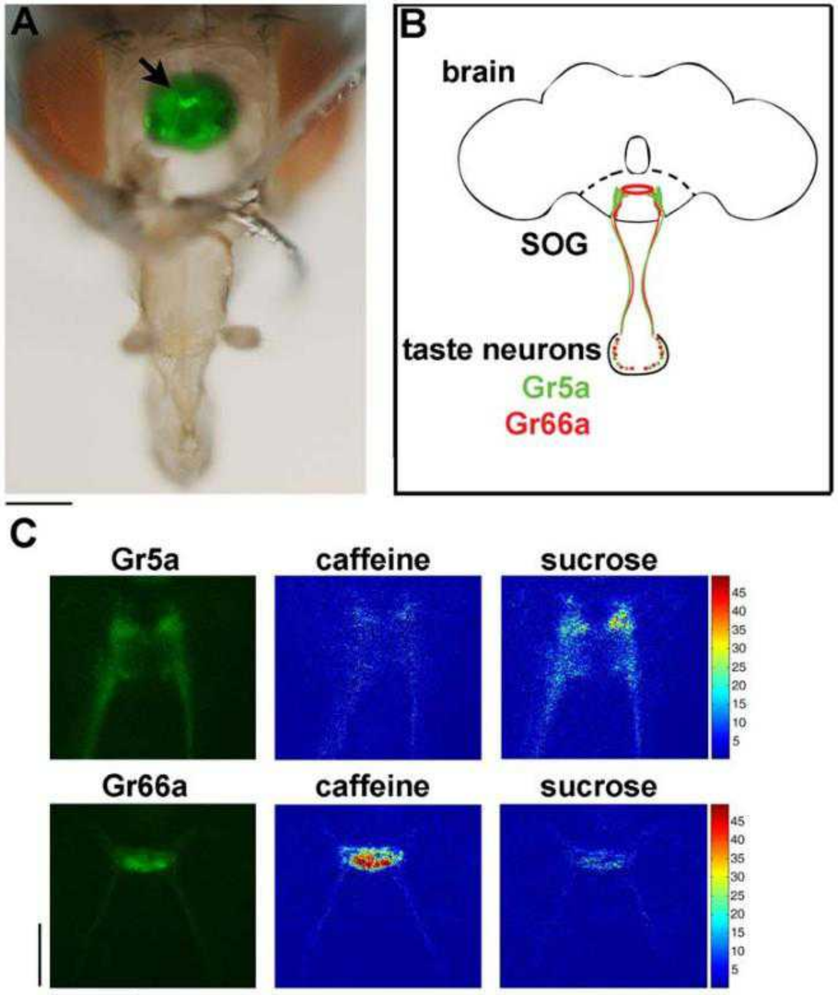
Gr64a mediates responses to several sugars



Dahanukar A et al. Neuron. 2007

3 Taste preferences of *Drosophila*.

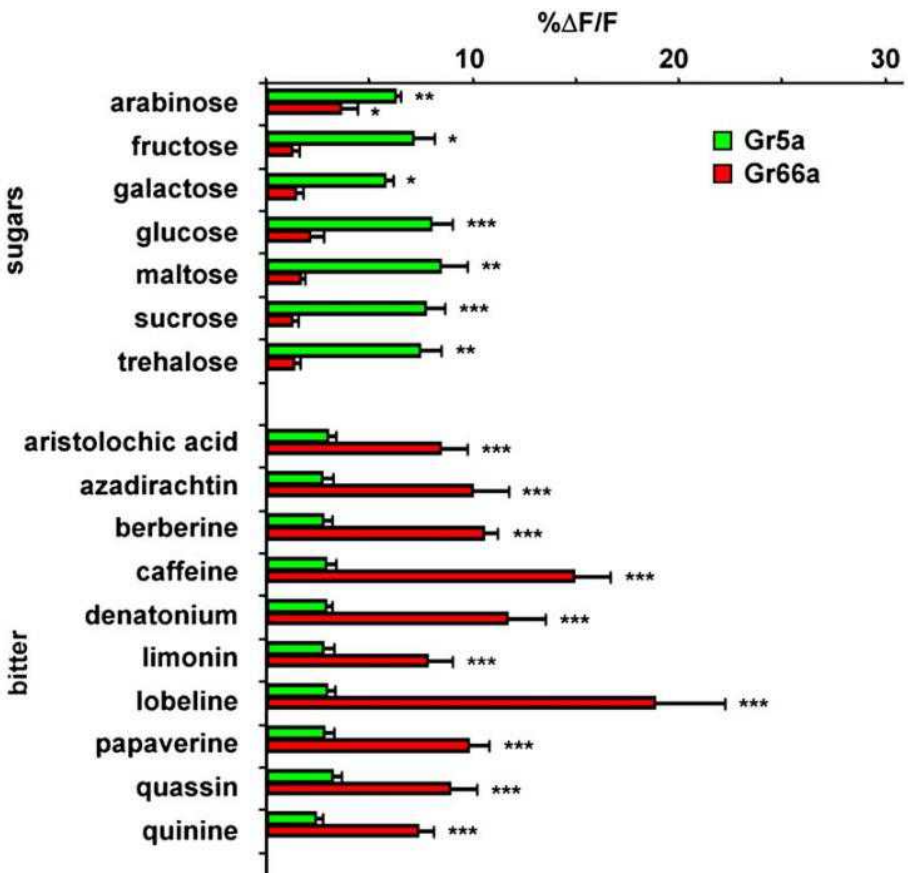
G-CaMP Monitors Taste-Induced Activity in the SOG

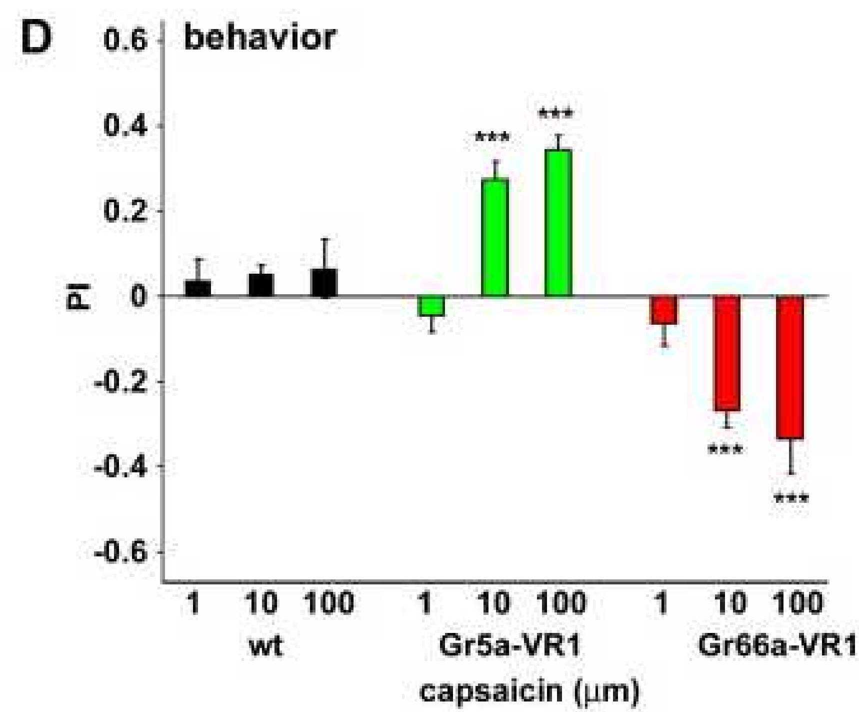


Sunanda Marella et al. Neuron. 2006

3 Taste preferences of *Drosophila*.

Gr66a responds to a number of bitter compounds and that mediates aversion

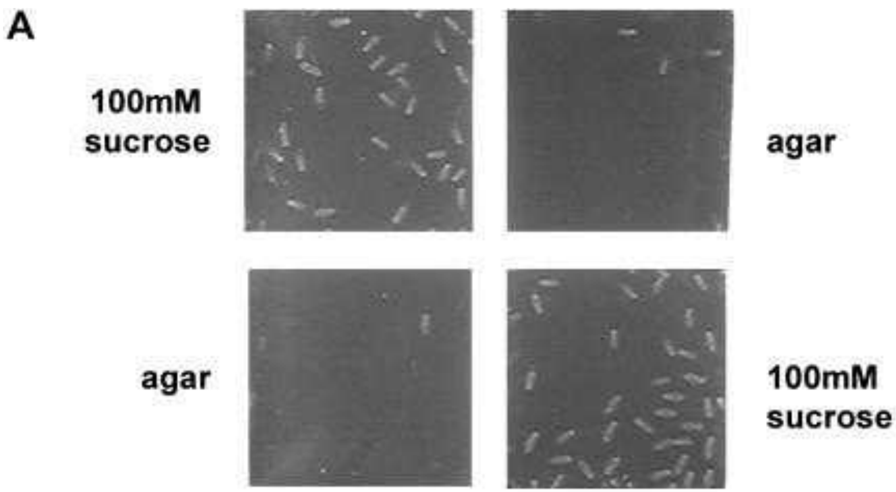


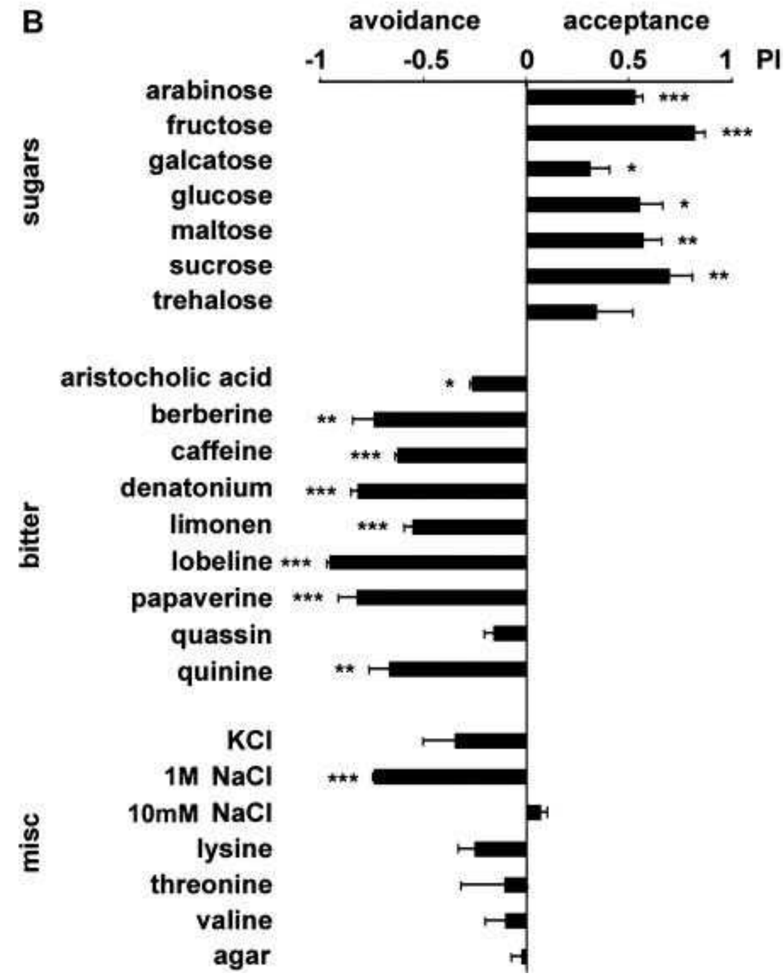


Sunanda Marella et al. Neuron. 2006

3 Taste preferences of *Drosophila*.

Wild-Type Flies Are Attracted to Substances that Activate Gr5a Cells, Avoid Those that Activate Gr66a Cells

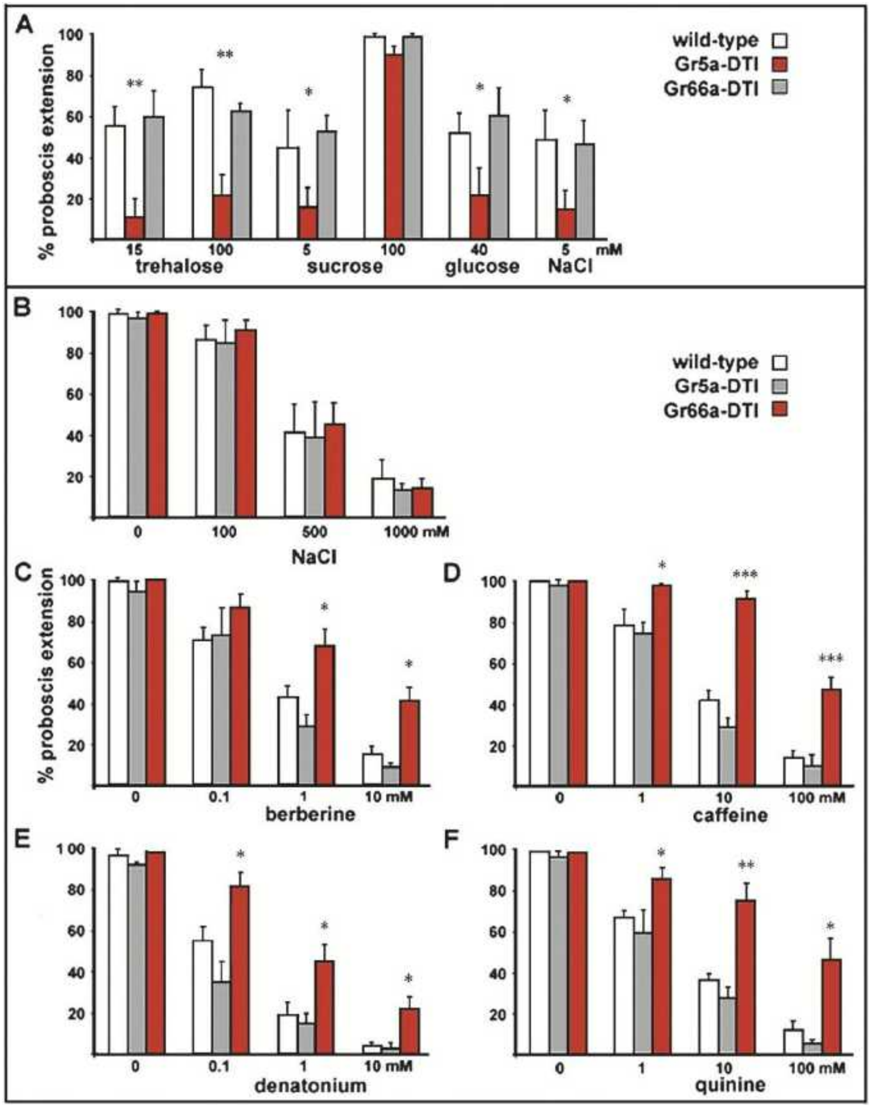




Sunanda Marella et al. Neuron. 2006

Taste preferences of *Drosophila*.

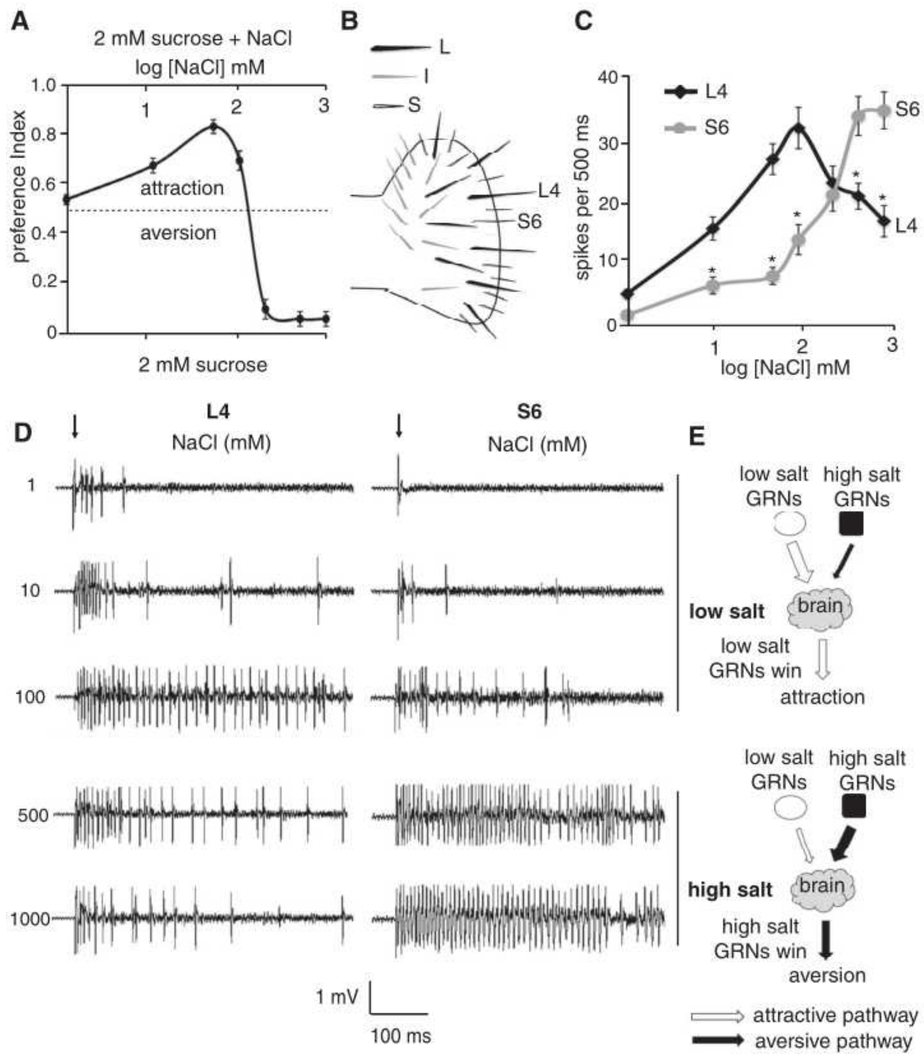
Gr5a Neurons and Gr66a Neurons Recognize Different Tastes and Mediate Different Behaviors



Zuoren Wang et al.Cell. 2004

Taste preferences of *Drosophila*.

Wild-type responses to different concentrations of salt



Yali V. Zhang et al. Nature. 2013

3 Taste preferences of *Drosophila*.

water

protein

fatty acid

sour

Reference

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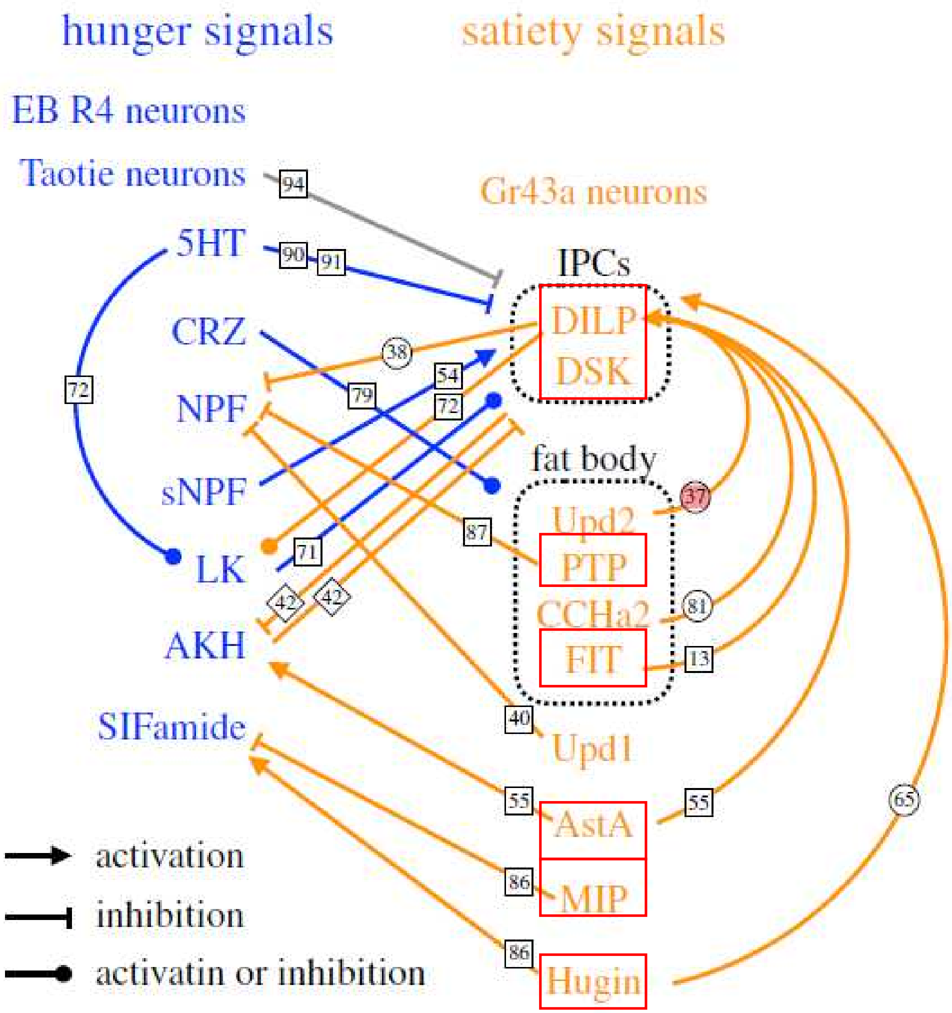
Key satiety signals that regulate feeding cessation in *Drosophila*

邢丽敏 2019/05/31


狂丸


摄入
消耗

Hunger and satiety signals and their interactions



Lin S, Senapati B, Tsao C-H.2019

sugar

protein

PNAS

Allatostatin-A neurons inhibit feeding behavior in adult *Drosophila*

Anne Christina Hergarden[a,b], Timothy D. Tayler[a,1], and David J. Anderson[a,b,2]
[a]Division of Biology 156-29 and [b]Howard Hughes Medical Institute, California Institute of Technology, Pasadena, CA 91125
Contributed by David J. Anderson, January 17, 2012 (sent for review October 20, 2011)

Cell

Sensing of Amino Acids in a Dopaminergic Circuitry Promotes Rejection of an Incomplete Diet in *Drosophila*

Marianne Bjordal,[1,2,3] Nathalie Arquier,[1,2,3] Julie Kniazeff,[4] Jean Philippe Pin,[4] and Pierre Léopold[1,2,3,*]
[1]University of Nice-Sophia Antipolis

Report

Current Biology

Identification of a Peptidergic Pathway Critical to Satiety Responses in *Drosophila*

ARTICLE

Received 9 Sep 2016 | Accepted 5 Dec 2016 | Published 19 Jan 2017 DOI: 10.1038/ncomms14161 OPEN

Drosophila FIT is a protein-specific satiety hormone essential for feeding control

Jinghan Sun[1,*], Chang Liu[1,*,†], Xiaobing Bai[1,2,3,*], Xiaoting Li[1], Jingyun Li[1], Zhiping Zhang[1], Yunpeng Zhang[1], Jing Guo[1] & Yan Li[1]

Open access, freely available online PLOS BIOLOGY

Insulin-producing cells in the *Drosophila* brain also express satiety-inducing cholecystokinin-like peptide, drosulfakinin

Jeannette A. E. Söderberg, Mikael A. Carlsson and Dick R. Nässel*
Department of Zoology, Stockholm University, Stockholm, Sweden

Candidate Gustatory Interneurons Modulating Feeding Behavior in the *Drosophila* Brain

Christoph Melcher, Michael J. Pankratz*
Institut für Genetik, Forschungszentrum Karlsruhe, Karlsruhe, Germany

RESEARCH ARTICLE

A fat-derived metabolite regulates a peptidergic feeding circuit in *Drosophila*

Do-Hyoung Kim[1], Minjung Shin[1], Sung-Hwan Jung[2], Young-Joon Kim[2], Walton D. Jones[1]*

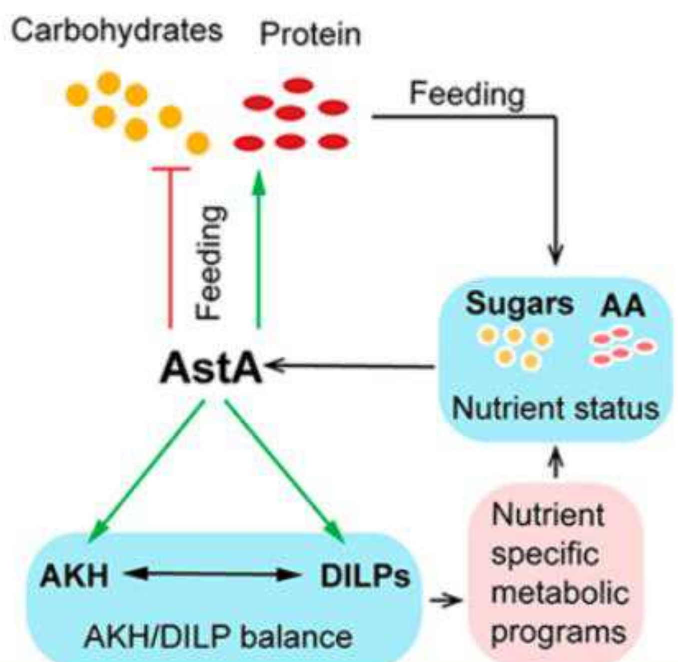
Allatostatin-A neurons inhibit feeding behavior in adult *Drosophila*

Anne Christina Hergarden[a,b], Timothy D. Tayler[a,1], and David J. Anderson[a,b,2]

[a]Division of Biology 156-29 and [b]Howard Hughes Medical Institute, California Institute of Technology, Pasadena, CA 91125

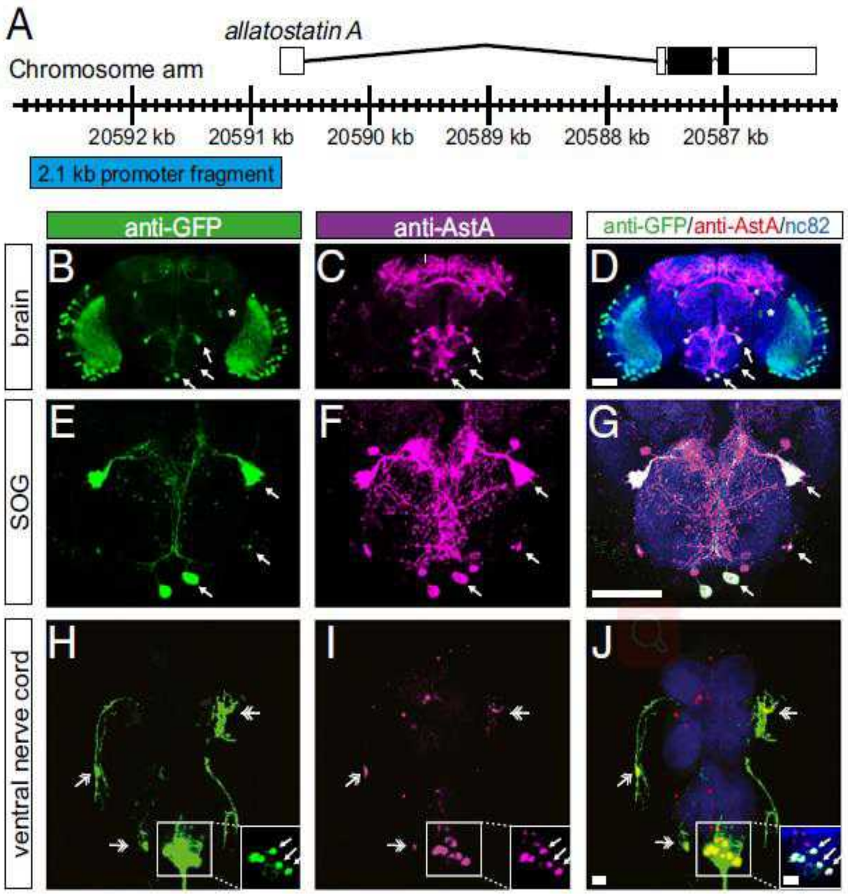
Contributed by David J. Anderson, January 17, 2012 (sent for review October 20, 2011)

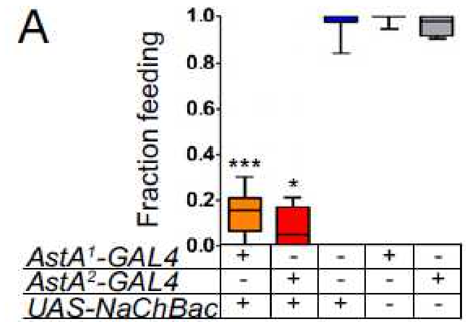
Activation of neurons (or neuroendocrine cells) expressing the neuropeptide allatostatin A (AstA) inhibits or limits several starvation-induced changes in feeding behavior in adult Drosophila, including increased food intake and enhanced behavioral responsiveness to sugar.



Julie L. Hentze *et al*. Sci Rep. 2015; 5: 11680

AstA Neurons Inhibit Starvation-Induced Feeding Behavior

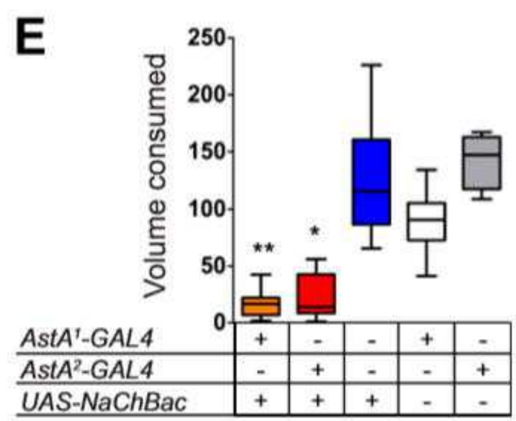


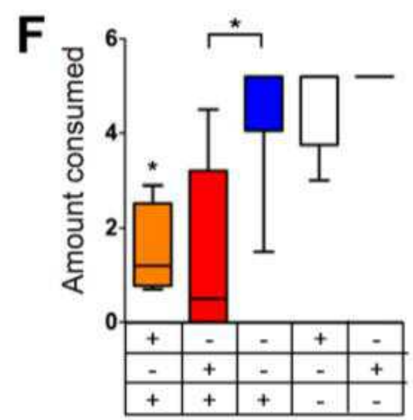


1h intake after satrved-24h

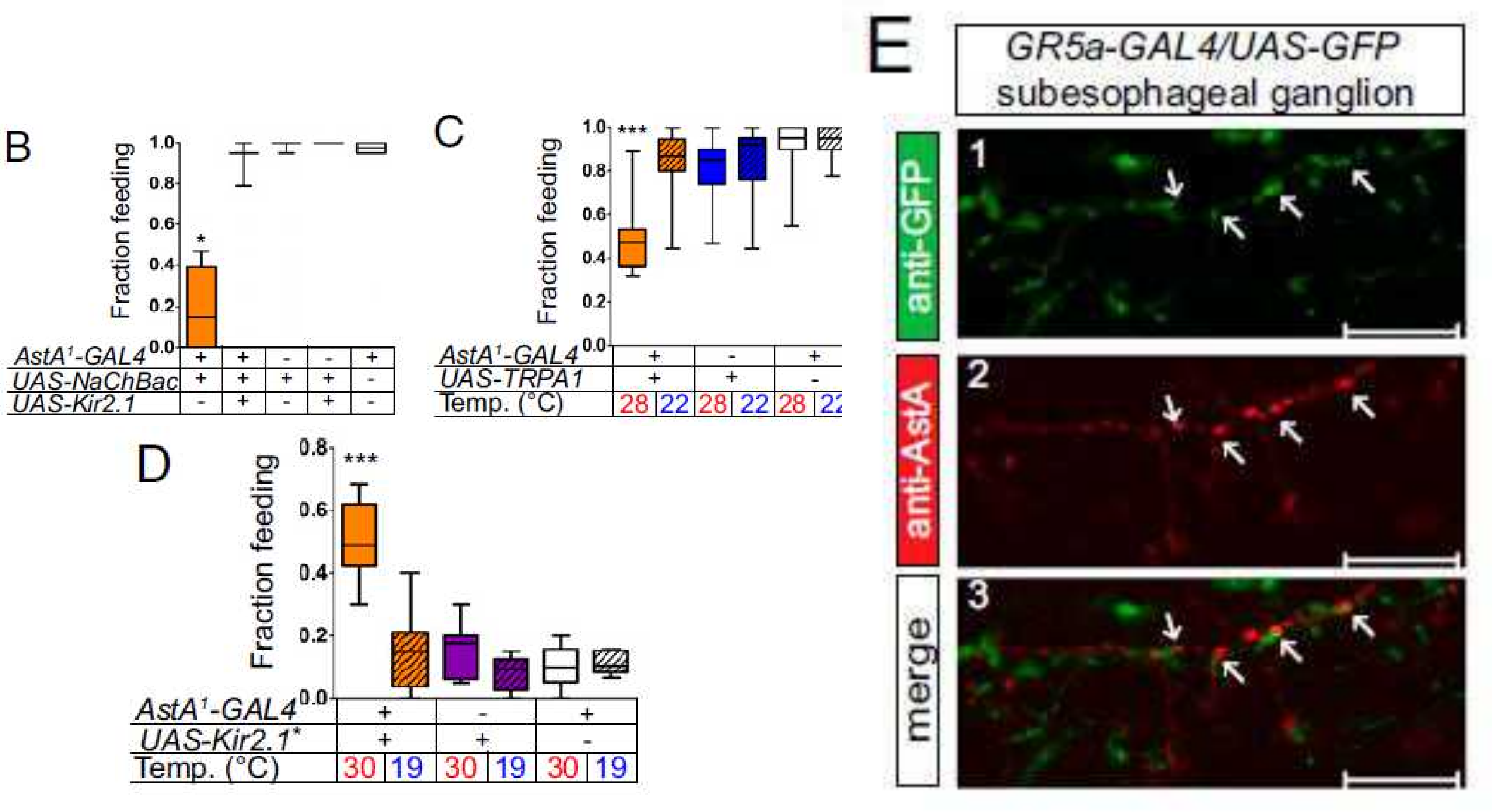
colorimetric quantification

CAFE

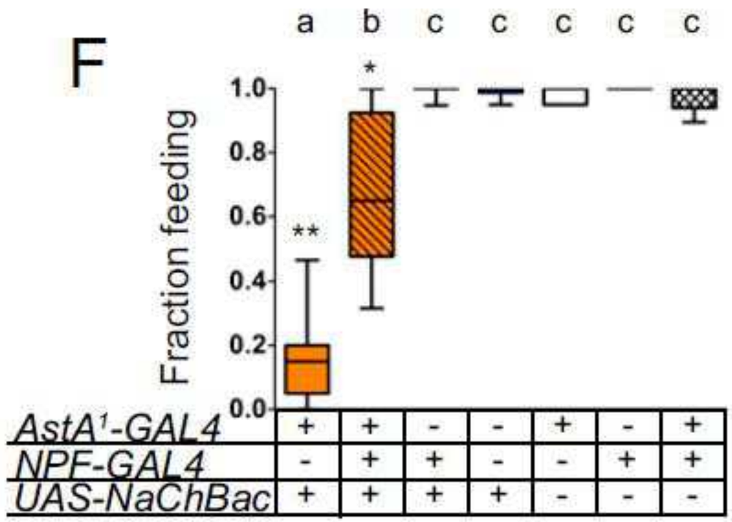


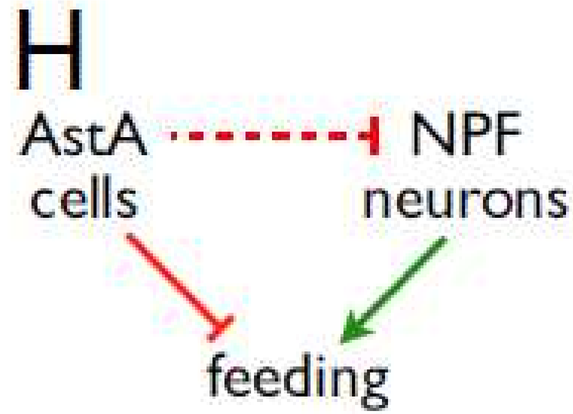


The reduced feeding phenotype was indeed due to increased activity of AstA neurons



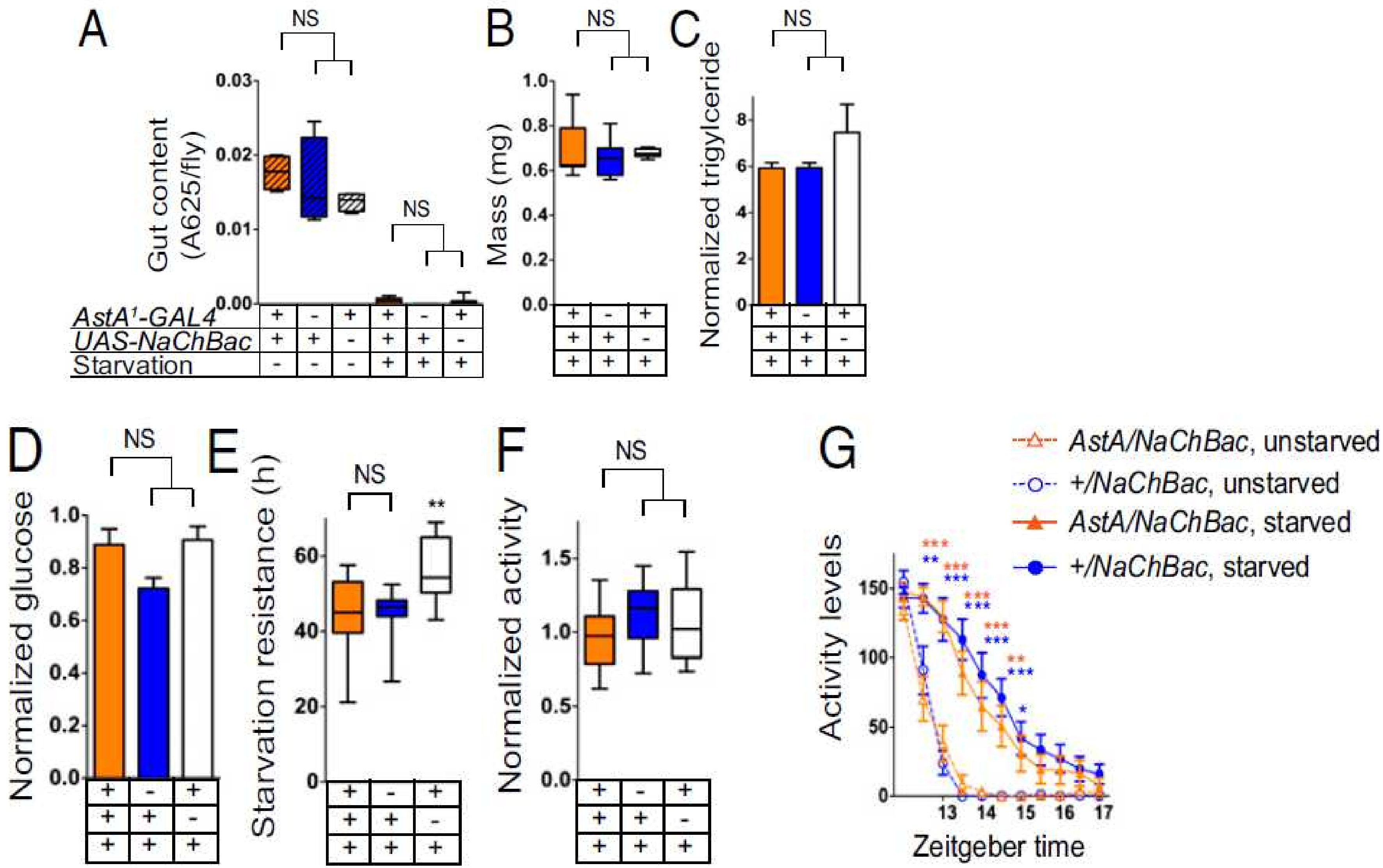
NPF Neuron Activation Suppresses the Inhibitory Influence of AstA Neuron Activation on Feeding.

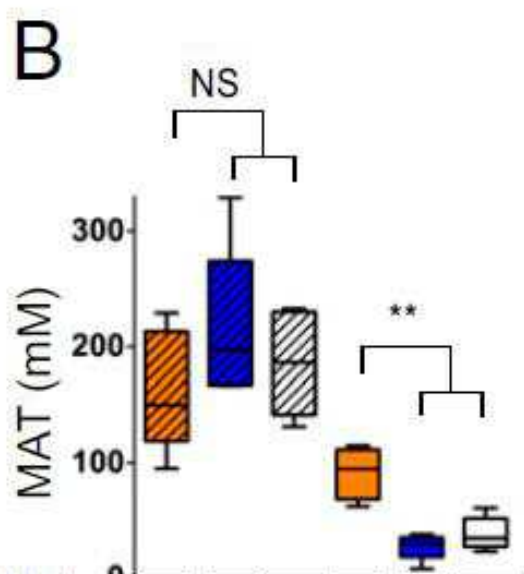




The influence of AstA neuron activation to suppress feeding is not nonspecific, but is exerted through an influence on pathways that normally promote food intake。

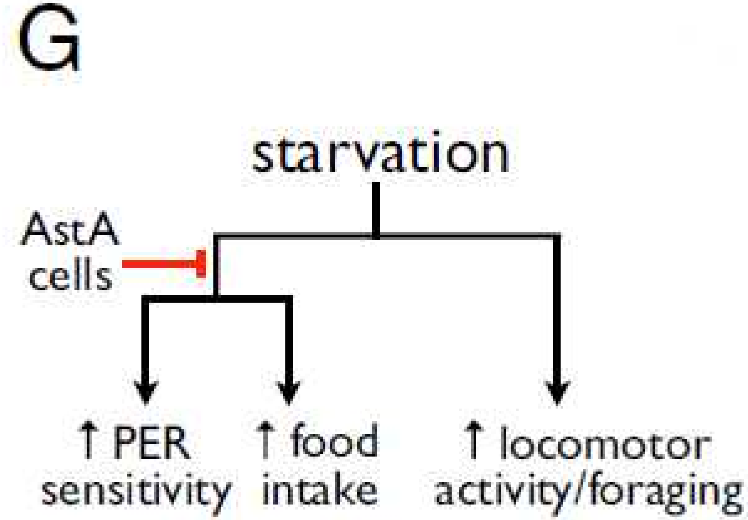
Energy stores and expenditure are unaffected in starved AstA/NaChBac flies.





AstA¹-GAL4	+	-	+	+	-	+
UAS-NaChBac	+	+	-	+	+	-
Starvation	-	-	-	+	+	+

Activation of AstA Neurons Inhibits Starvation-Induced Enhancement of PER Behavior.

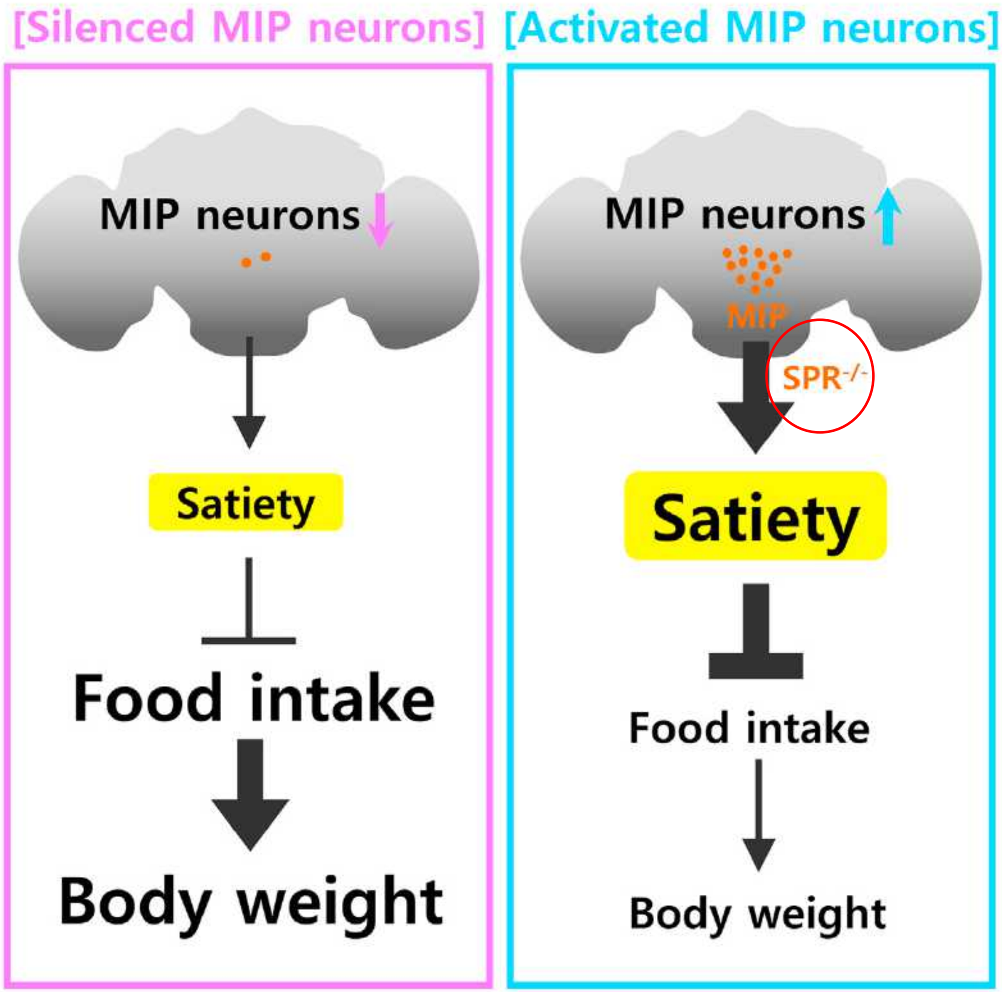


AstA cells inhibit starvation induced increases in food intake and PER sensitivity, but not locomotor activity.

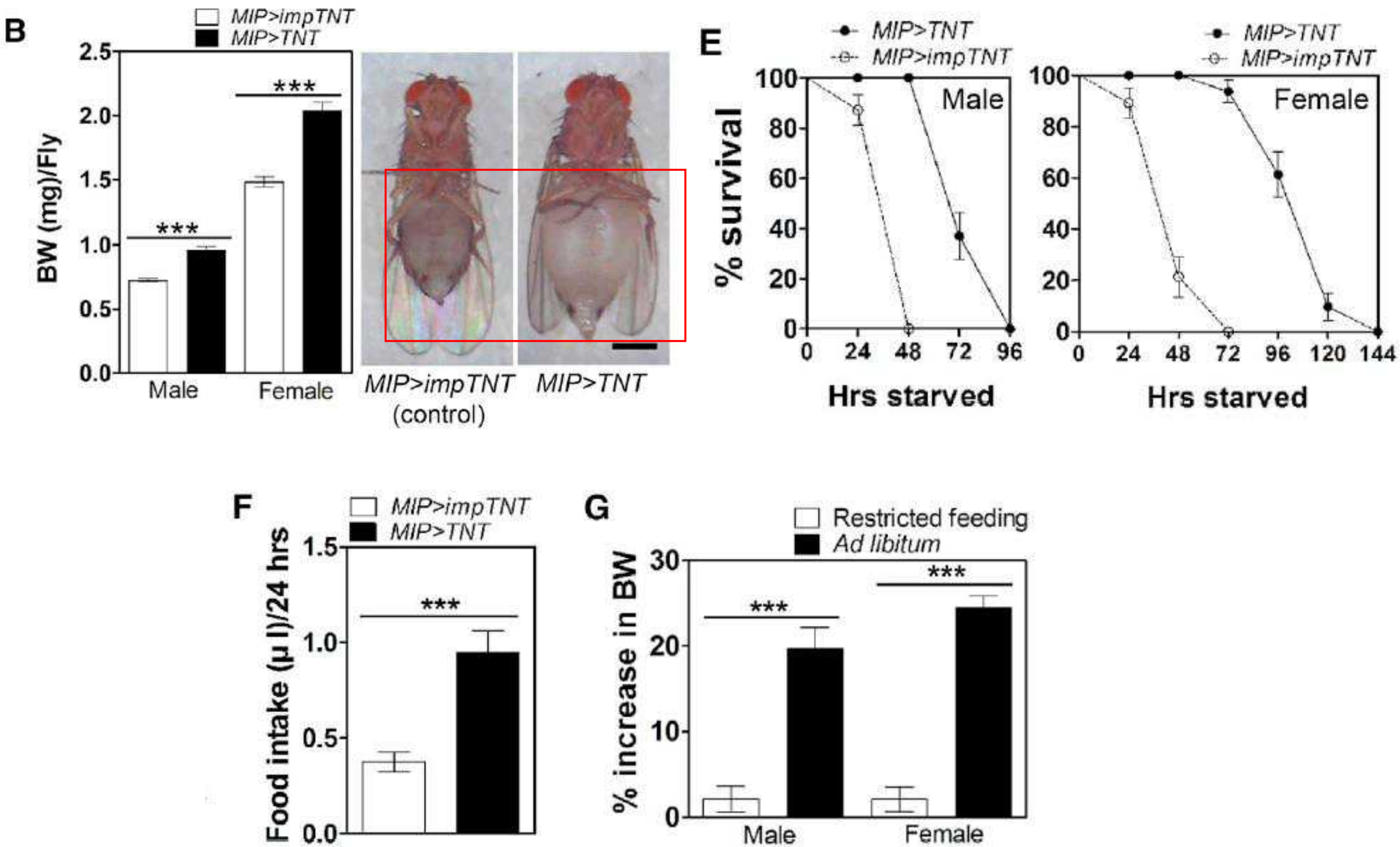
Current Biology
Report

Identification of a Peptidergic Pathway Critical to Satiety Responses in *Drosophila*

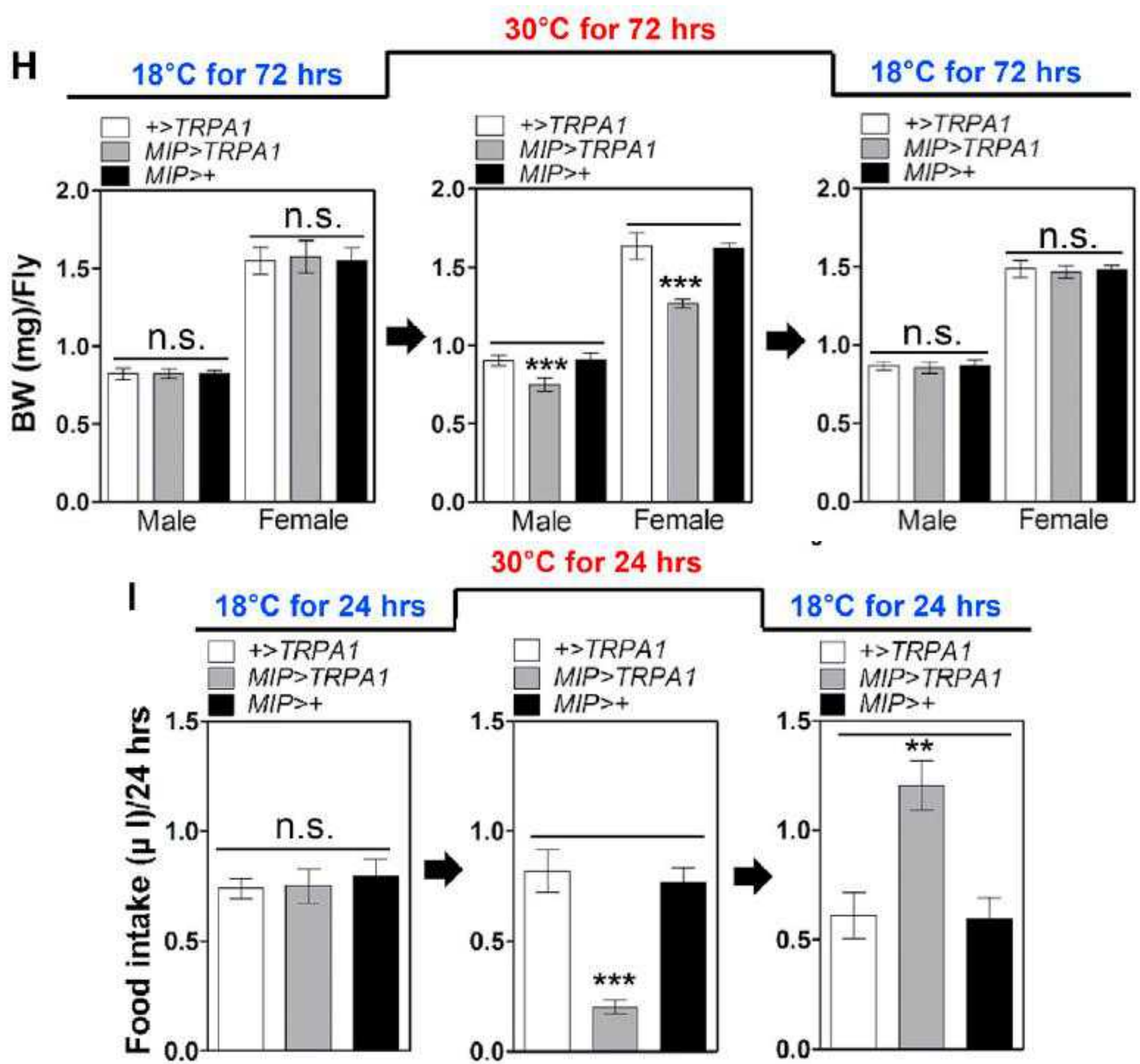
Soohong Min,[1] Hyo-Seok Chae,[2] Yong-Hoon Jang,[2] Sekyu Choi,[1] Sion Lee,[3] Yong Taek Jeong,[4] Walton D. Jones,[3] Seok Jun Moon,[4] Young-Joon Kim,[2,*] and Jongkyeong Chung[1,*]



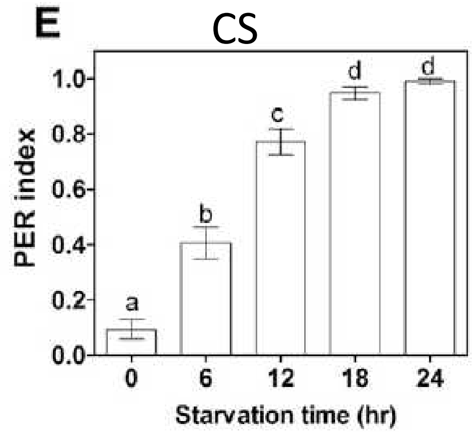
BW increase of MIP>TNT flies more evident compared to controls

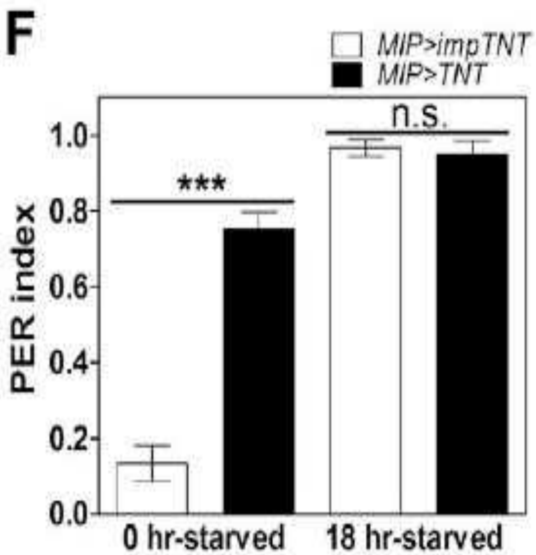


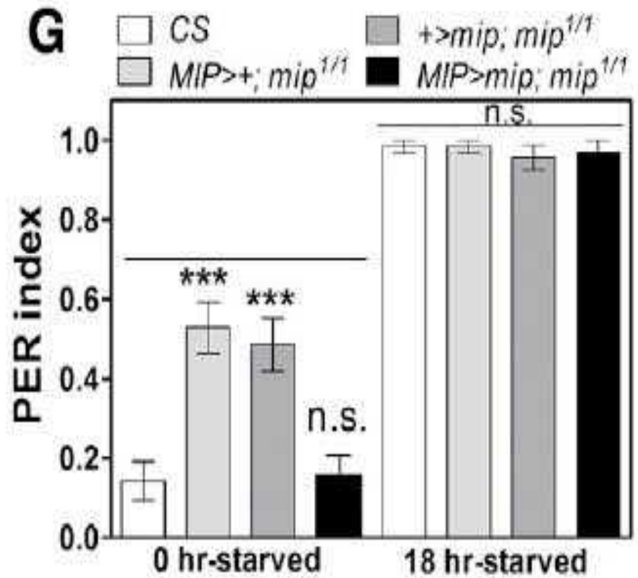
The MIP neuron activation reduces the BW and suppresses food intake and acts as switch

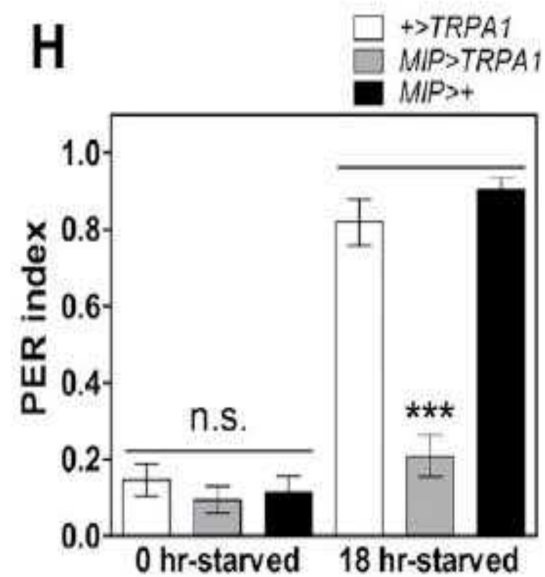


MIP neurons is linked to the state of satiety









inhibition

mutant

activation

Insulin-producing cells in the *Drosophila* brain also express satiety-inducing cholecystokinin-like peptide, drosulfakinin

Jeannette A. E. Söderberg, Mikael A. Carlsson and Dick R. Nässel *

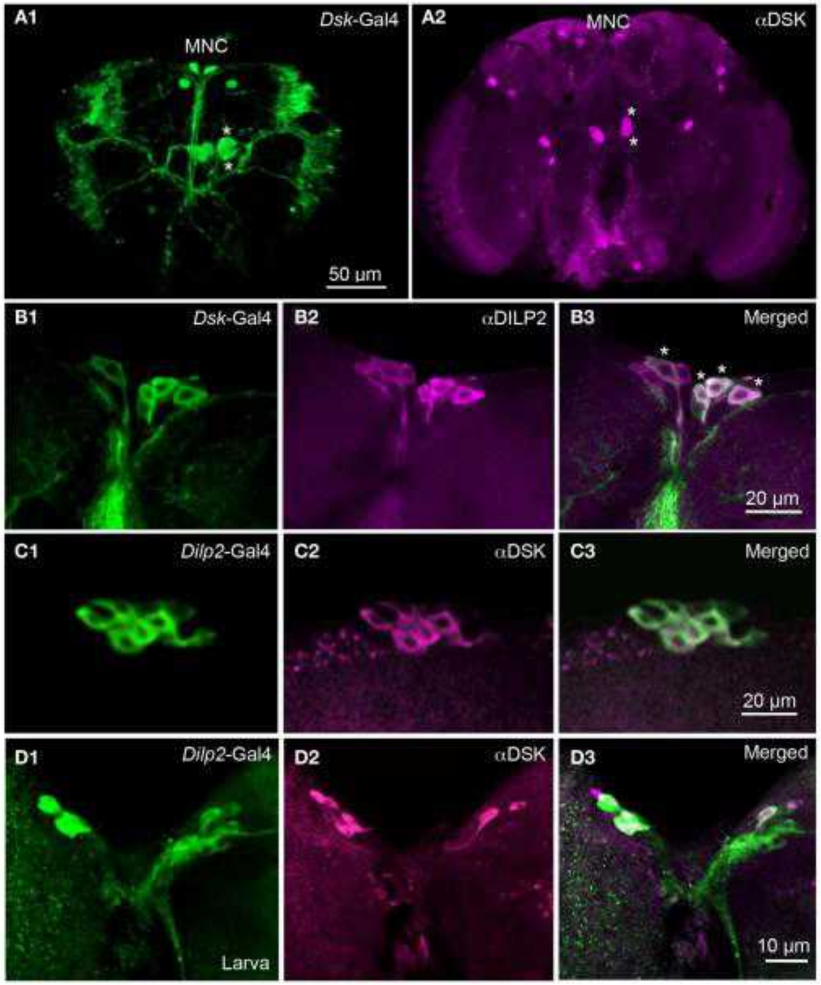
Department of Zoology, Stockholm University, Stockholm, Sweden

Analyzed the effects of diminishing DSKs or DILPs employing the Gal4-UAS system by

(1) diminishing DSK-levels without directly affecting DILP levels by targeted Dsk-RNAi, either in all DSK producing cells (DPCs) or only in the IPCs

(2) expressing a hyperpolarizing potassium channel to inactivate either all the DPCs or only the IPCs, affecting release of both peptides

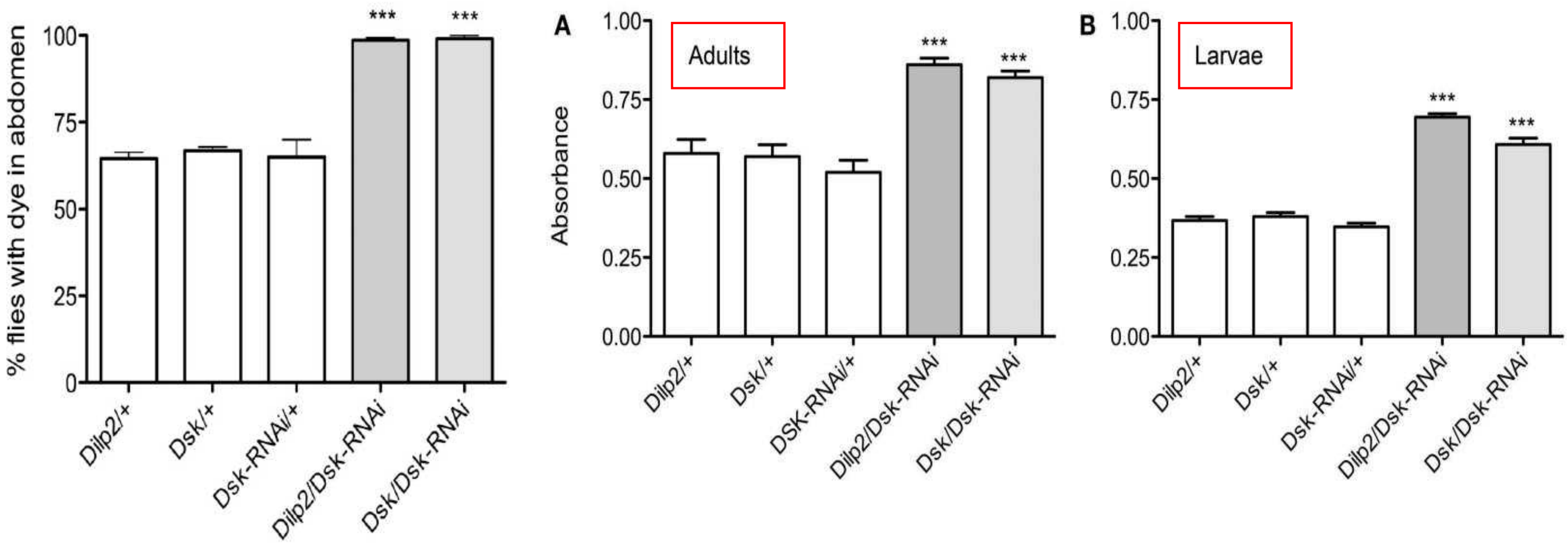
Dilp2-expressing IPCs also display DSK immunoreactivity.



The co-localization of DILPs and DSKs in the IPCs suggests that the hormonal actions of the two sets of peptides may be functionally coordinated.

DSK deficient flies consume more food than controls

starved 18h——normal food 15mins——dye



Dsk-RNAi in the IPCs is sufficient to induce a defective feeding phenotype and no additional effect was detected after knocking down Dsk in all of the DPCs.

Dsk-knockdown by RNAi in the IPCs (and DPCs) extends lifespan at starvation

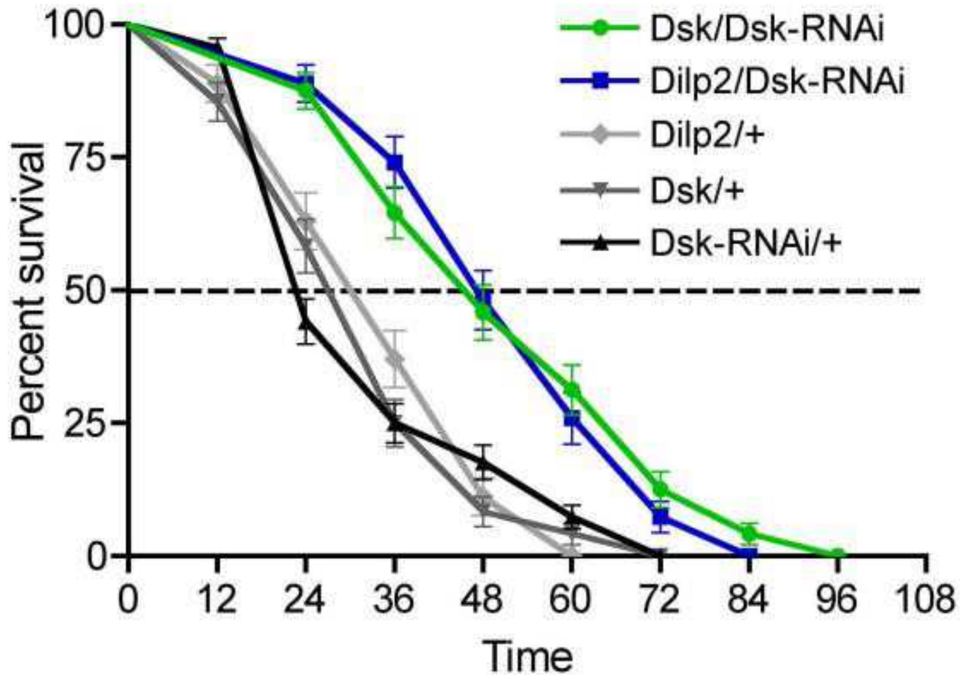
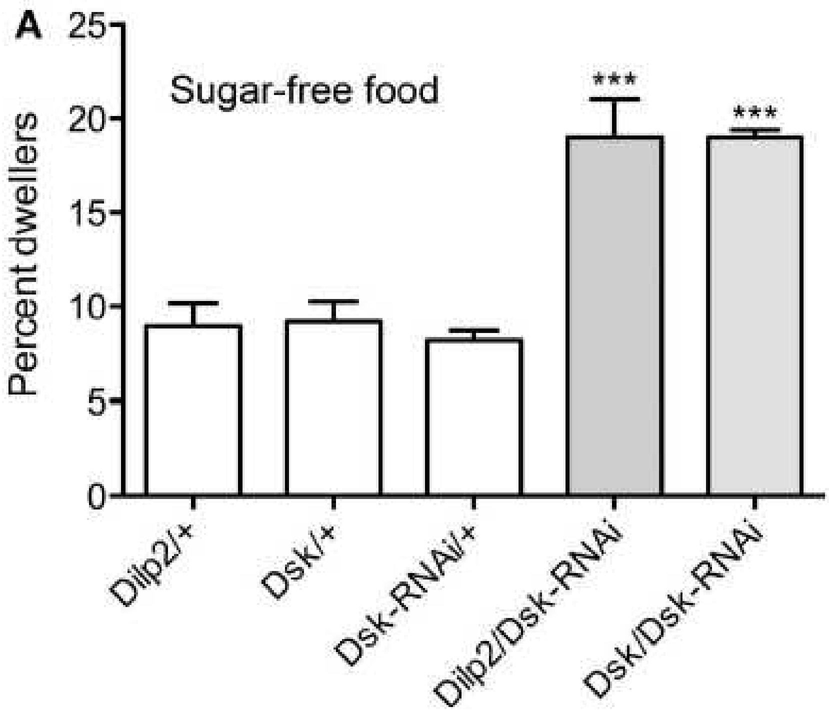
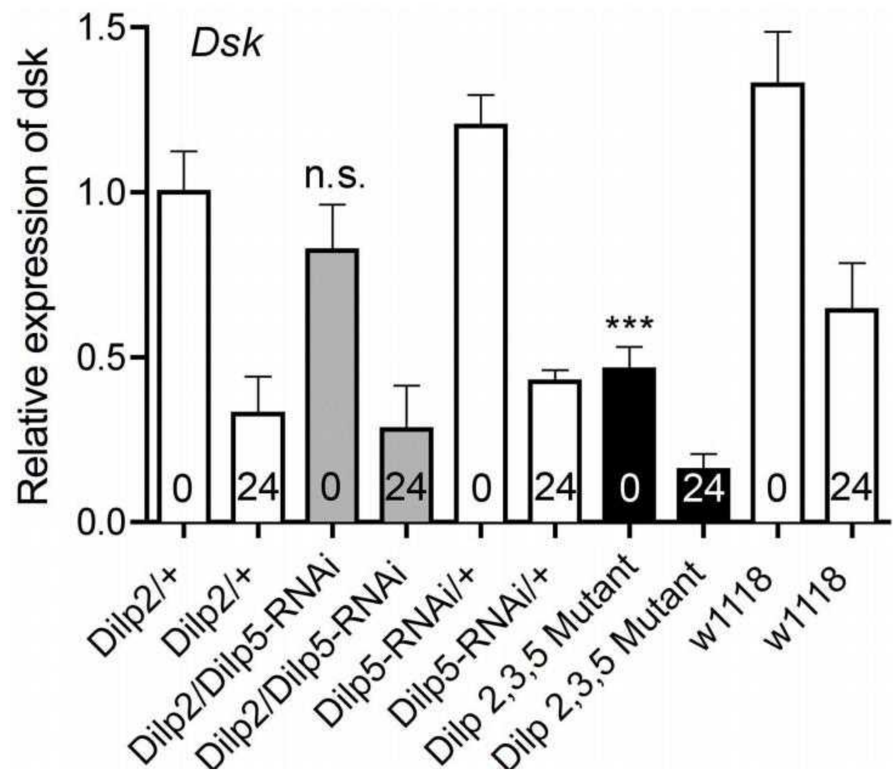


FIGURE 8 | Drosulfakinin and *Drosophila* insulin-like peptide deficient flies are more resistant to starvation. We tested the effect of

DSKs affect larval food choice behavior.

The levels of *Dsk*/DSK affect the *Dilp*/DILP levels via feedback regulation





sugar

protein

PNAS

Allatostatin-A neurons inhibit feeding behavior in adult *Drosophila*

Anne Christina Hergarden[a,b], Timothy D. Tayler[a,1], and David J. Anderson[a,b,2]
[a]Division of Biology 156-29 and [b]Howard Hughes Medical Institute, California Institute of Technology, Pasadena, CA 91125
Contributed by David J. Anderson, January 17, 2012 (sent for review October 20, 2011)

Report

Current Biology

Identification of a Peptidergic Pathway Critical to Satiety Responses in *Drosophila*

Insulin-producing cells in the *Drosophila* brain also express satiety-inducing cholecystokinin-like peptide, drosulfakinin

Jeannette A. E. Söderberg, Mikael A. Carlsson and Dick R. Nässel *
Department of Zoology, Stockholm University, Stockholm, Sweden

Cell

Sensing of Amino Acids in a Dopaminergic Circuitry Promotes Rejection of an Incomplete Diet in *Drosophila*

Marianne Bjordal,[1,2,3] Nathalie Arquier,[1,2,3] Julie Kniazeff,[4] Jean Philippe Pin,[4] and Pierre Léopold[1,2,3,*]
[1]University of Nice-Sophia Antipolis

ARTICLE
Received 9 Sep 2016 | Accepted 5 Dec 2016 | Published 19 Jan 2017 DOI: 10.1038/ncomms14161 OPEN

Drosophila FIT is a protein-specific satiety hormone essential for feeding control

Jinghan Sun[1,*], Chang Liu[1,*,†], Xiaobing Bai[1,2,3,*], Xiaoting Li[1], Jingyun Li[1], Zhiping Zhang[1], Yunpeng Zhang[1], Jing Guo[1] & Yan Li[1]

Open access, freely available online PLoS BIOLOGY

Candidate Gustatory Interneurons Modulating Feeding Behavior in the *Drosophila* Brain

Christoph Melcher, Michael J. Pankratz*
Institut für Genetik, Forschungszentrum Karlsruhe, Karlsruhe, Germany

RESEARCH ARTICLE

A fat-derived metabolite regulates a peptidergic feeding circuit in *Drosophila*

Do-Hyoung Kim[1], Minjung Shin[1], Sung-Hwan Jung[2], Young-Joon Kim[2], Walton D. Jones[1] *

SCIENTIFIC REPORTS

OPEN A molecular and neuronal basis

HHS Public Access
Author manuscript
J Neurogenet. Author manuscript; available in PMC 2018 September 01.
Published in final edited form as:
J Neurogenet. 2018 March ; 32(1): 27–36. doi:10.1080/01677063.2017.1406934.

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Accepted: 2(

Author Manuscript

 | Biology Open (2017) 6, 365-369 doi:10.1242/bio.020412

The Company of Biologists

RESEARCH ARTICLE

A

Preference for and learning of amino acids in larval *Drosophila*

Cell Research
www.nature.com/cr
www.cell-research.com

Check for updates

ARTICLE OPEN

A p

Cell

con

Zhe Ya

Sensing of Amino Acids in a Dopaminergic Circuitry Promotes Rejection of an Incomplete Diet in *Drosophila*

PA Author Manuscrip

Amino acid sensing in dietary-restriction-mediated longevity: roles of signal-transducing kinases GCN2 and TOR

Jordan Gallinetti[1], **Eylul Harputlugil**[1], and **James R. Mitchell**[2]
Department of Genetics and Complex Diseases, Harvard School of Public Health, 655 Huntington Avenue, Boston, MA 02115, U.S.A.

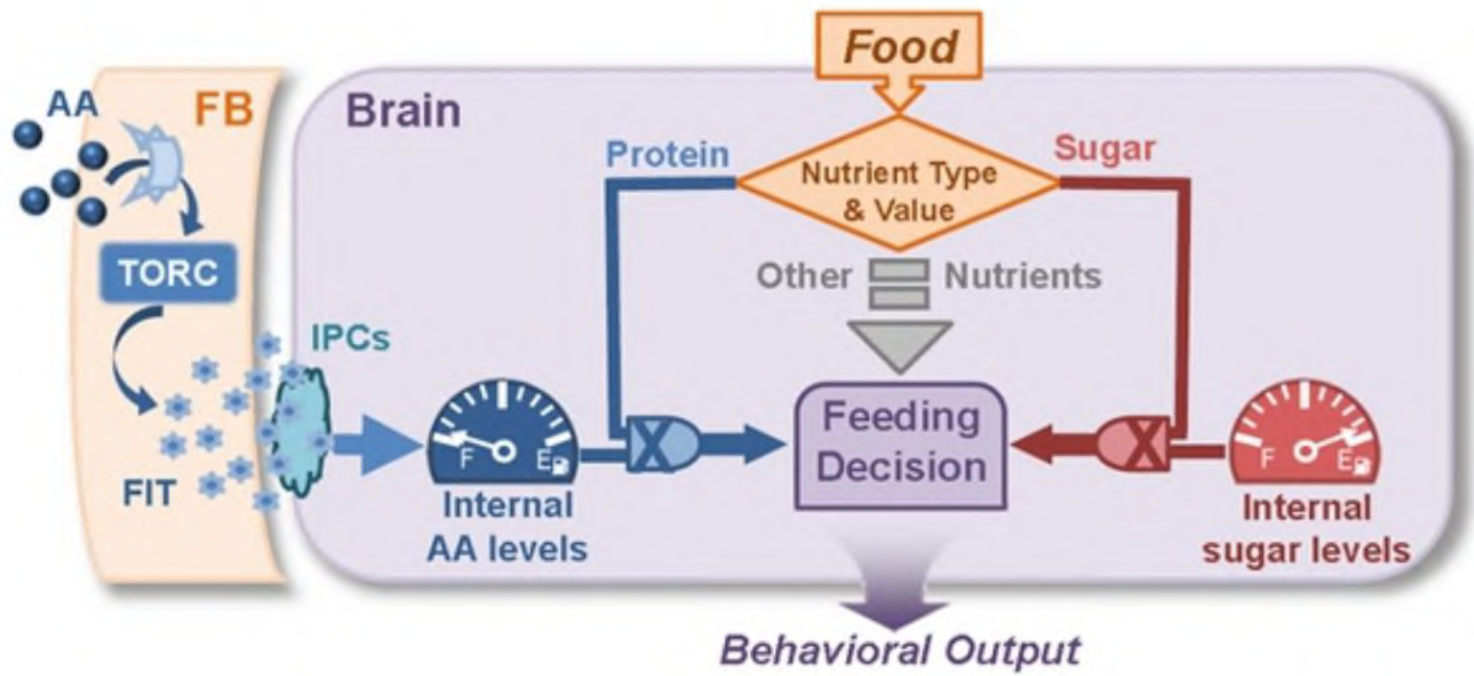
nature COMMUNICATIONS

ARTICLE

Received 9 Sep 2016 | Accepted 5 Dec 2016 | Published 19 Jan 2017 DOI: 10.1038/ncomms14161 OPEN

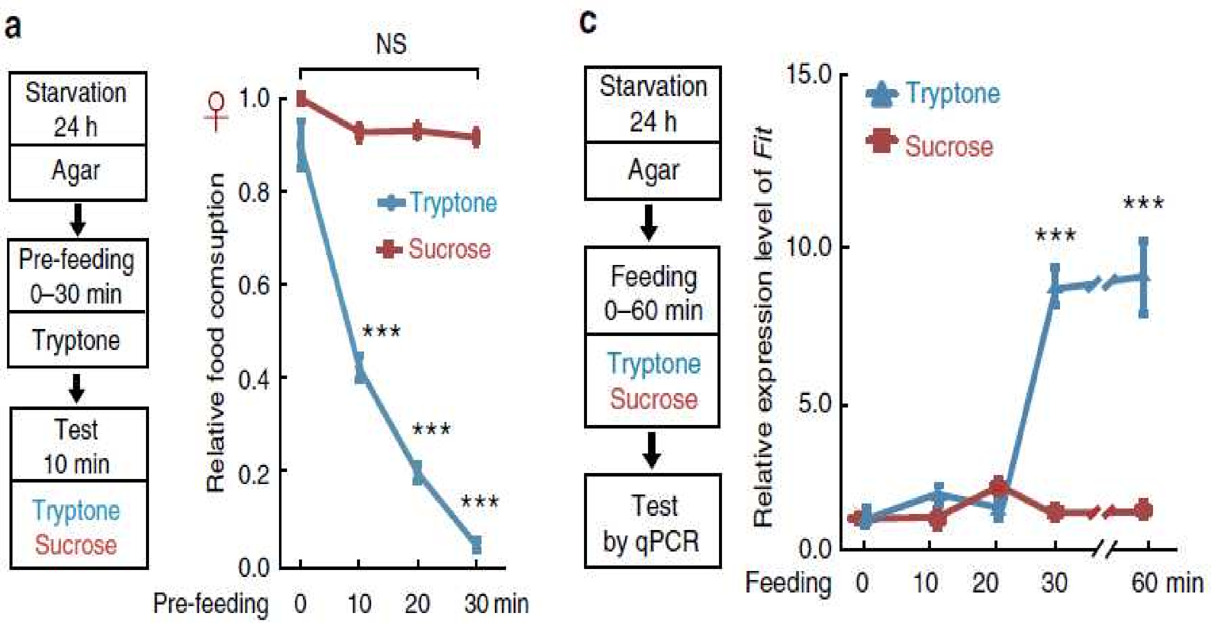
Drosophila FIT is a protein-specific satiety hormone essential for feeding control

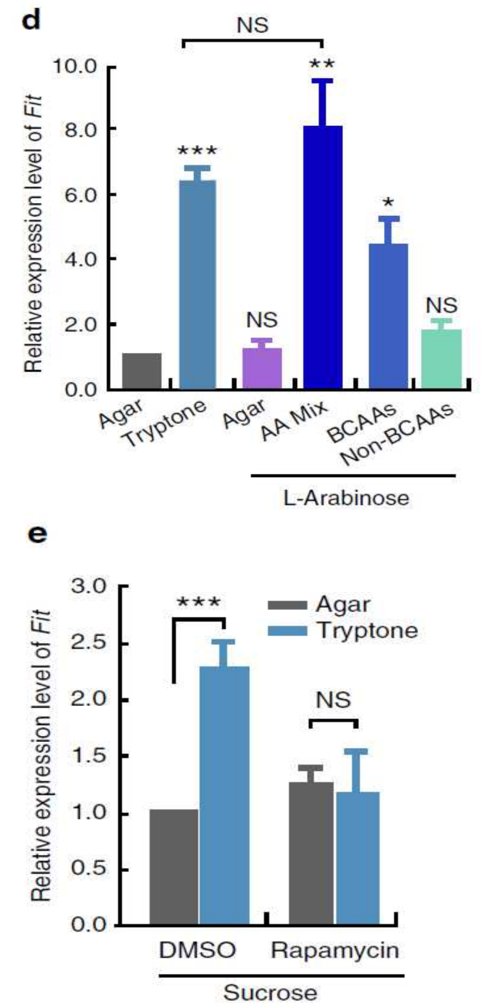
Jinghan Sun[1,*], Chang Liu[1,*,†], Xiaobing Bai[1,2,3,*], Xiaoting Li[1], Jingyun Li[1], Zhiping Zhang[1], Yunpeng Zhang[1], Jing Guo[1] & Yan Li[1]



Fit expression is elevated selectively by protein-intake.

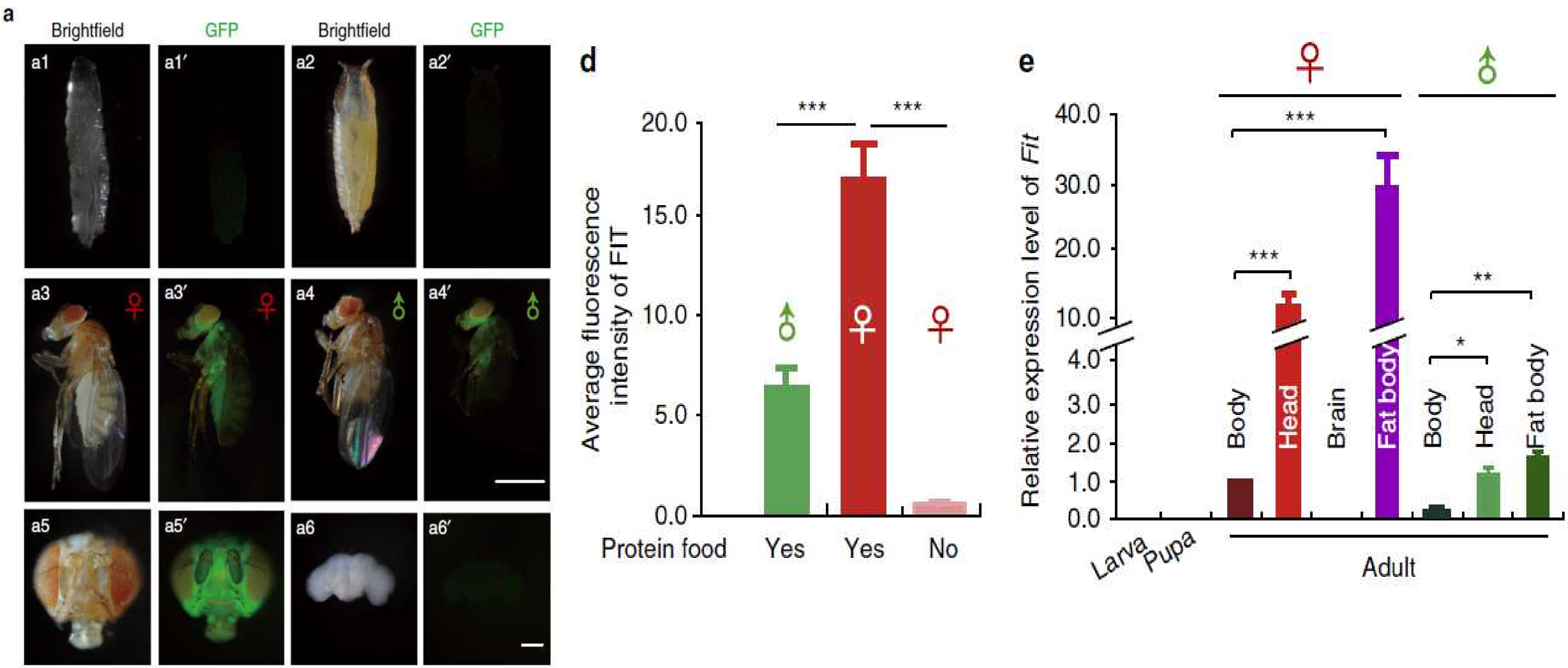
Is there a protein-specific satiety signal?





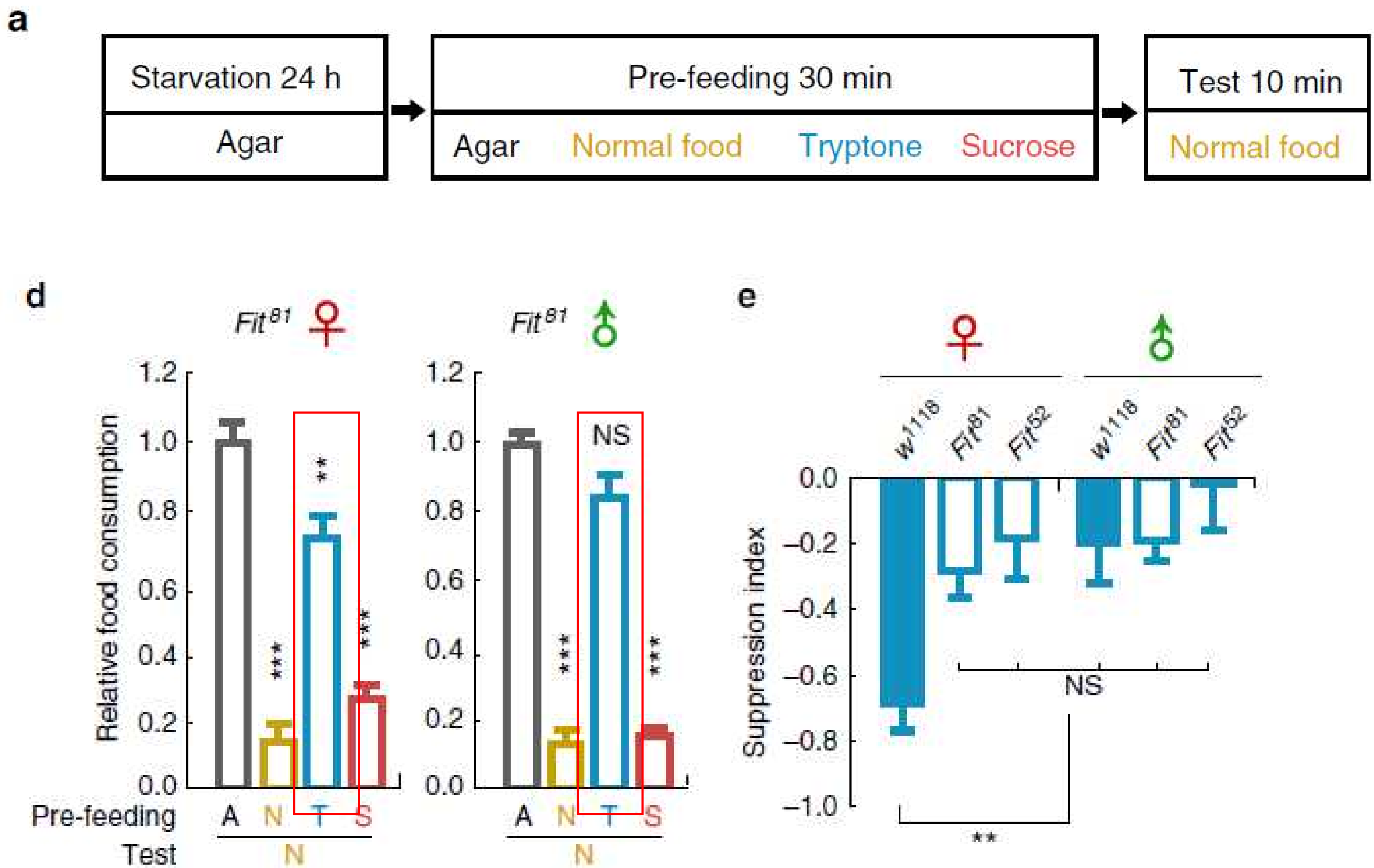
Protein food promotes Fit expression, with this regulation being under the control of the TOR pathway.

Fit is an adult-specific FB gene highly expressed in females



Fit is expressed in adult heads and enriched in the FB with a sexual difference bigger than 10-fold, suggesting that it plays a bigger role in female flies.

Fit KO female flies exhibit deficiencies in protein feeding behaviour

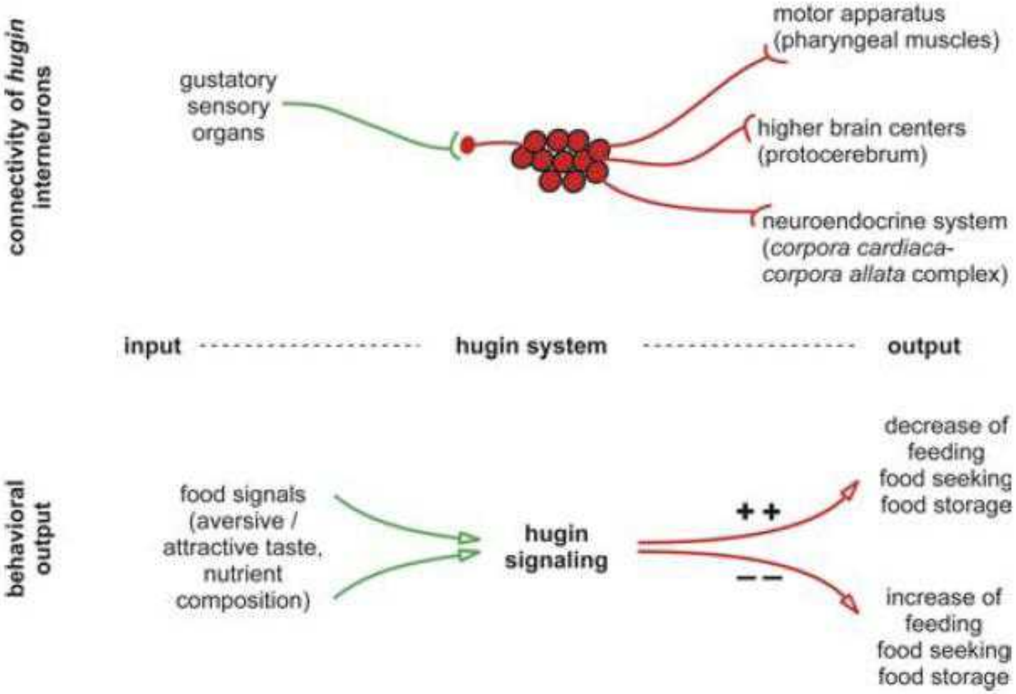


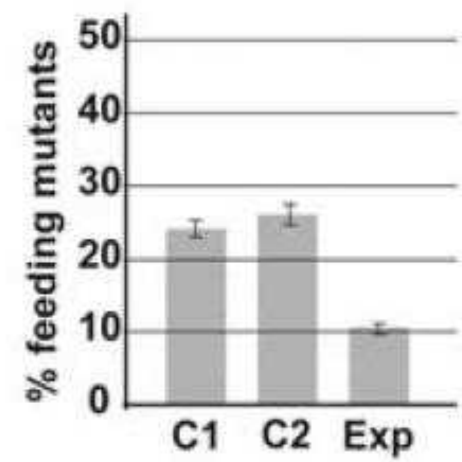
Open access, freely available online PLoS BIOLOGY

Candidate Gustatory Interneurons Modulating Feeding Behavior in the *Drosophila* Brain

Christoph Melcher, Michael J. Pankratz*

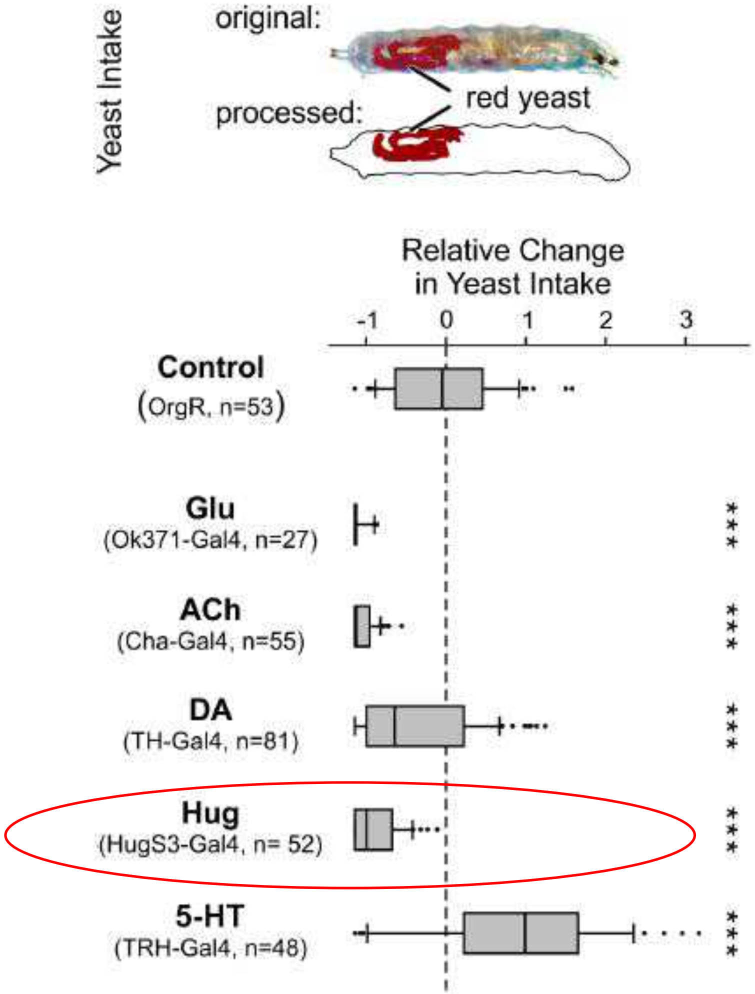
Institut für Genetik, Forschungszentrum Karlsruhe, Karlsruhe, Germany

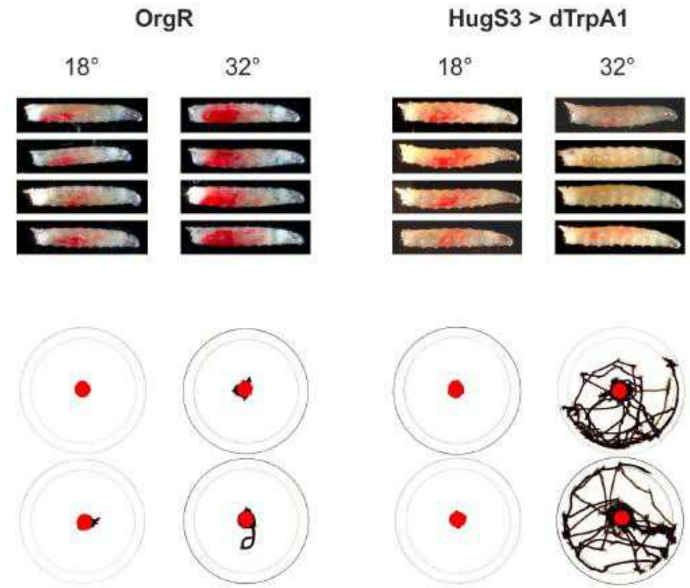




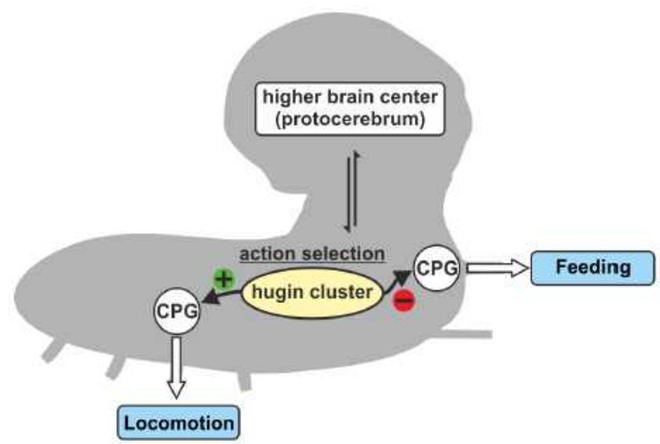
Increased hug signaling correlates with decreased feeding, whereas decreased hug signaling correlates with increased feeding

klu-hug





Activation of Neurons Expressing Hugin Neuropeptide Suppresses Feeding and Increases Wandering-like Behavior



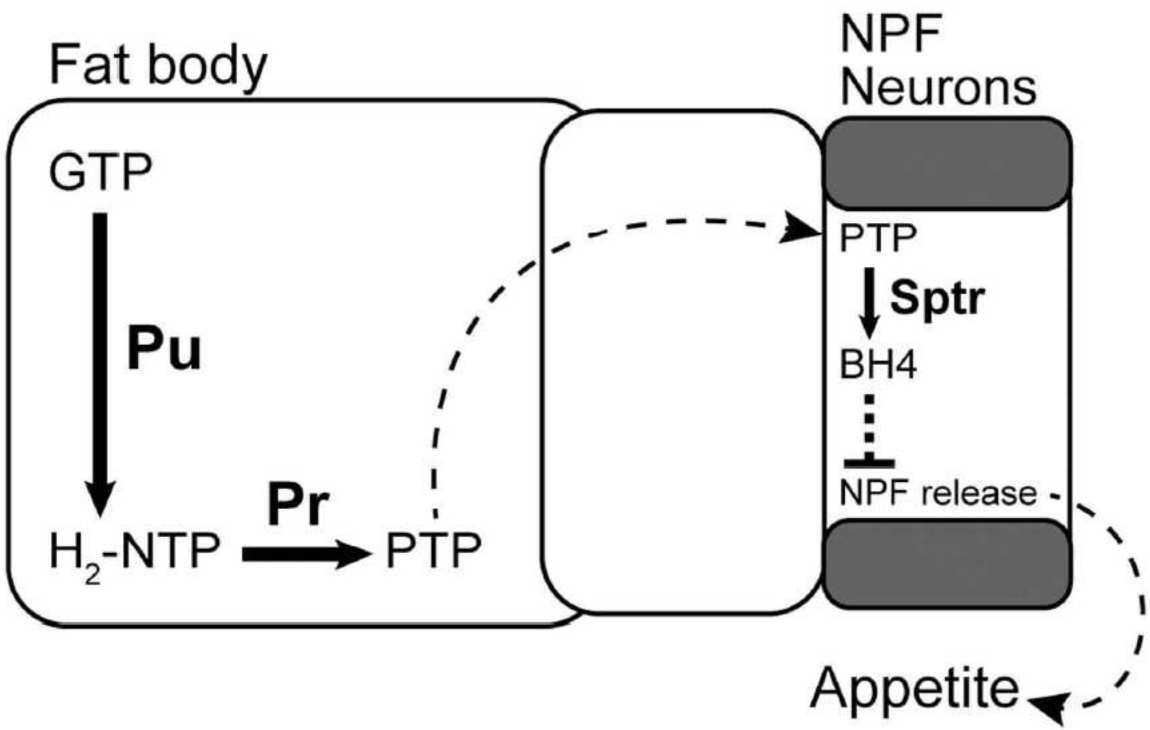
The expression of hugin regulates yeast intake

2014 Schoofs *et al*. PLoS Biol 12(6): e1001893.

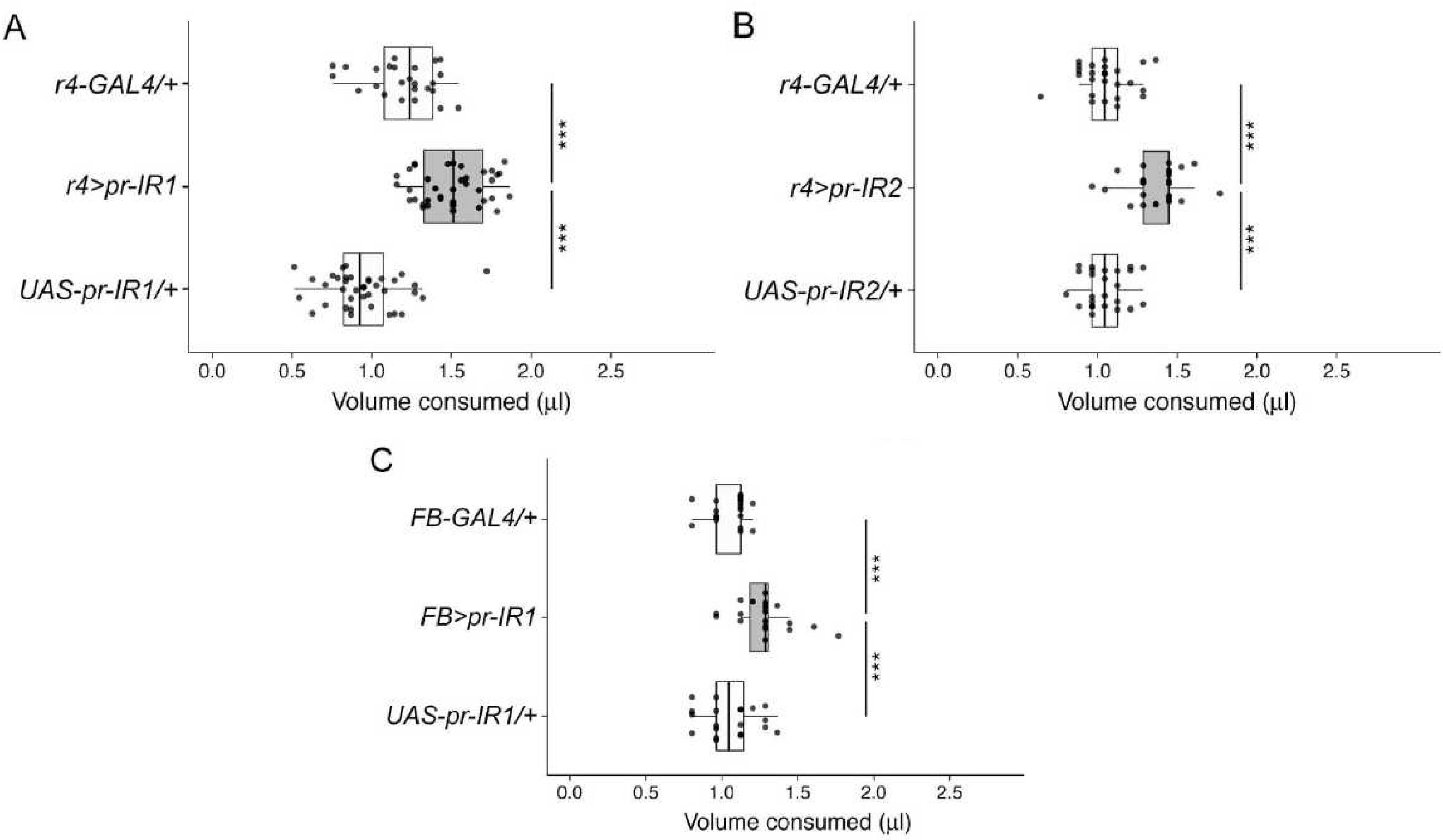
RESEARCH ARTICLE

A fat-derived metabolite regulates a peptidergic feeding circuit in *Drosophila*

Do-Hyoung Kim[1☯], Minjung Shin[1☯], Sung-Hwan Jung[2], Young-Joon Kim[2], Walton D. Jones[1]*



pr loss-of-function in the fat body induces a general appetite enhancement



QUESTION

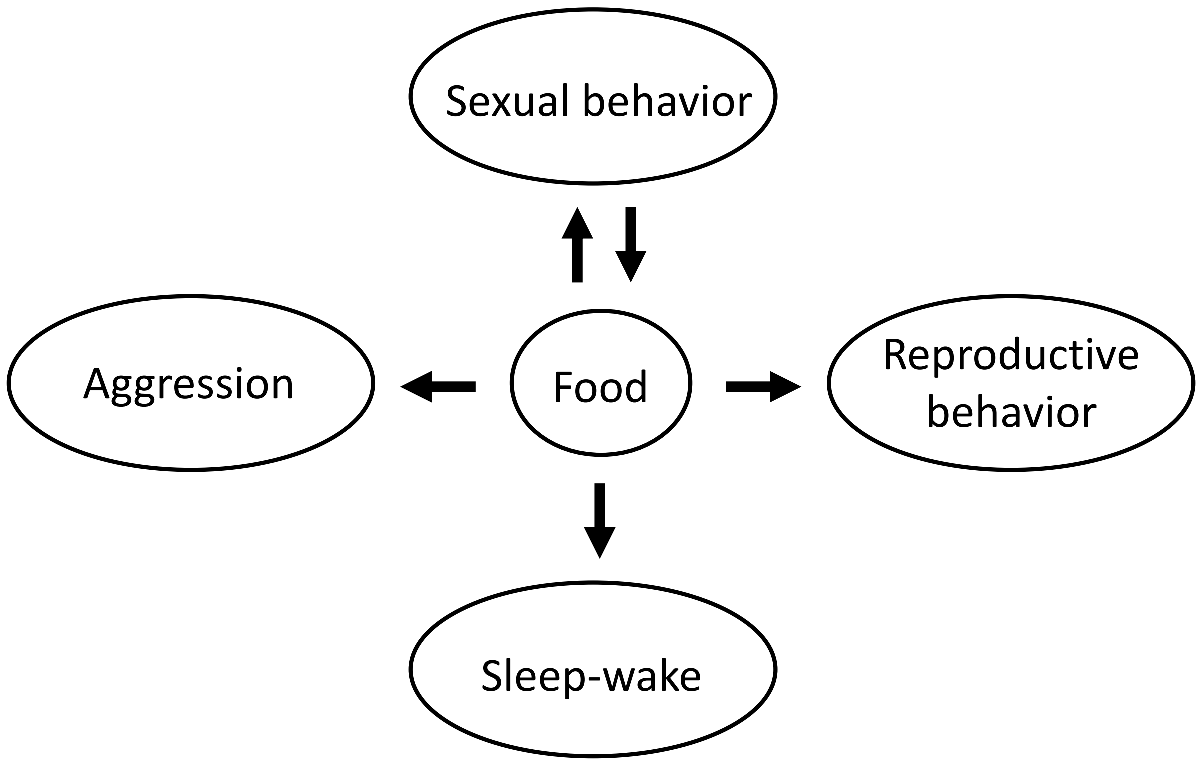
- Search the relationship between FIT and DSX?

Dietary modulation of different behaviors

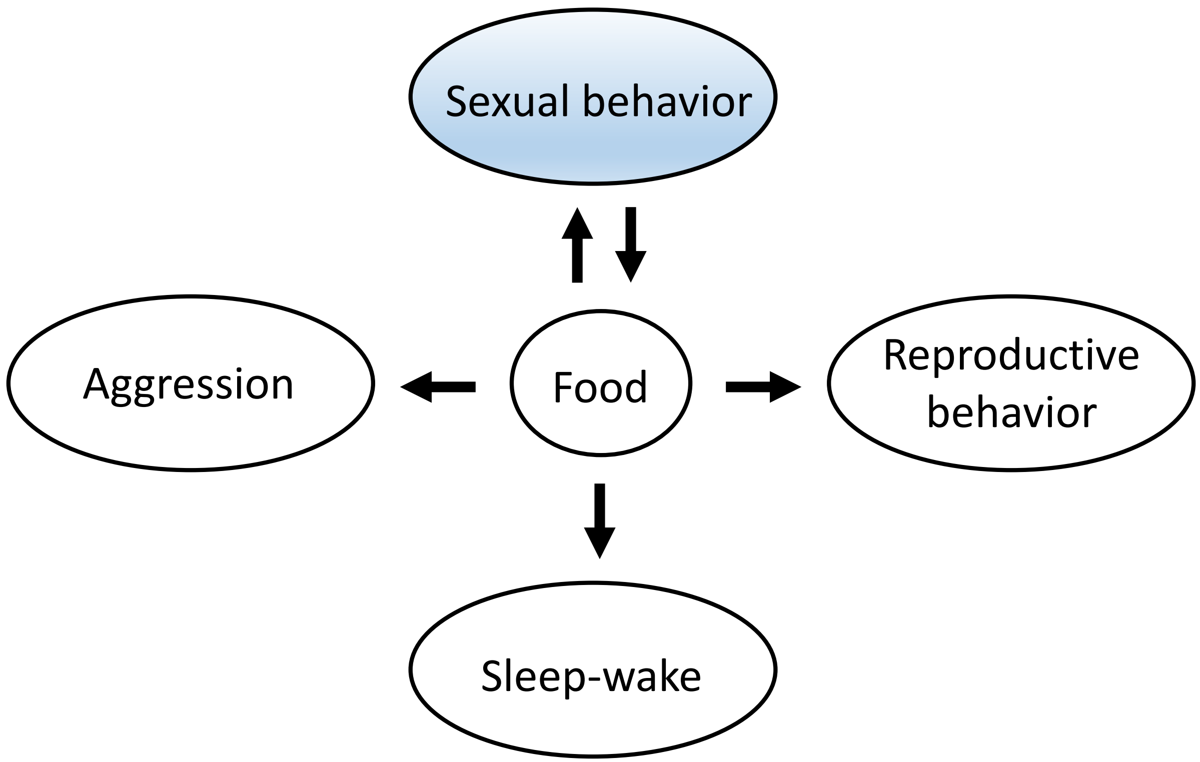
Peng Qionglin

2019-05-31

Connections between food and different behaviors



Connections between food and different behaviors

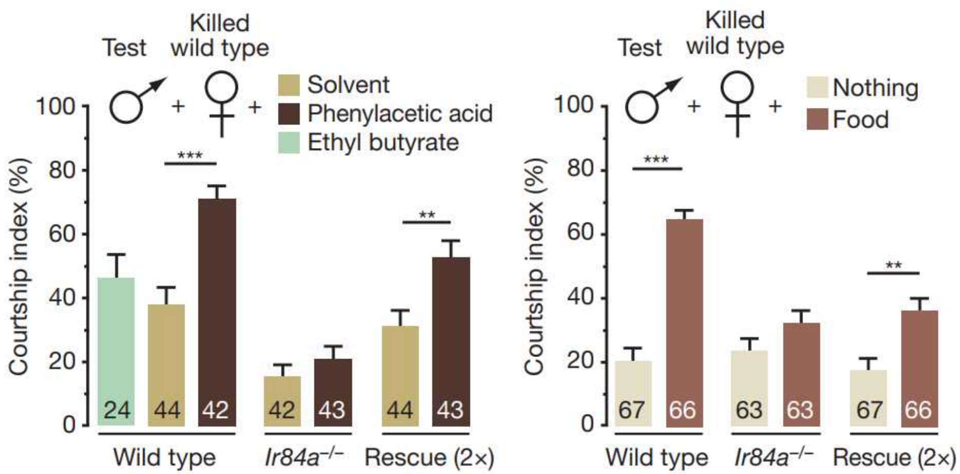


LETTER

doi:10.1038/nature10428

An olfactory receptor for food-derived odours promotes male courtship in *Drosophila*

Yael Grosjean[1,2], Raphael Rytz[1], Jean-Pierre Farine[2], Liliane Abuin[1], Jérôme Cortot[2], Gregory S. X. E. Jefferis[3] & Richard Benton[1]



Food odor promotes male courtship

Phenylacetic acid 苯乙酸

Ethyl butyrate 乙酸乙酯

Grosjean, Y., et al. (2011)

SCIENTIFIC REPORTS

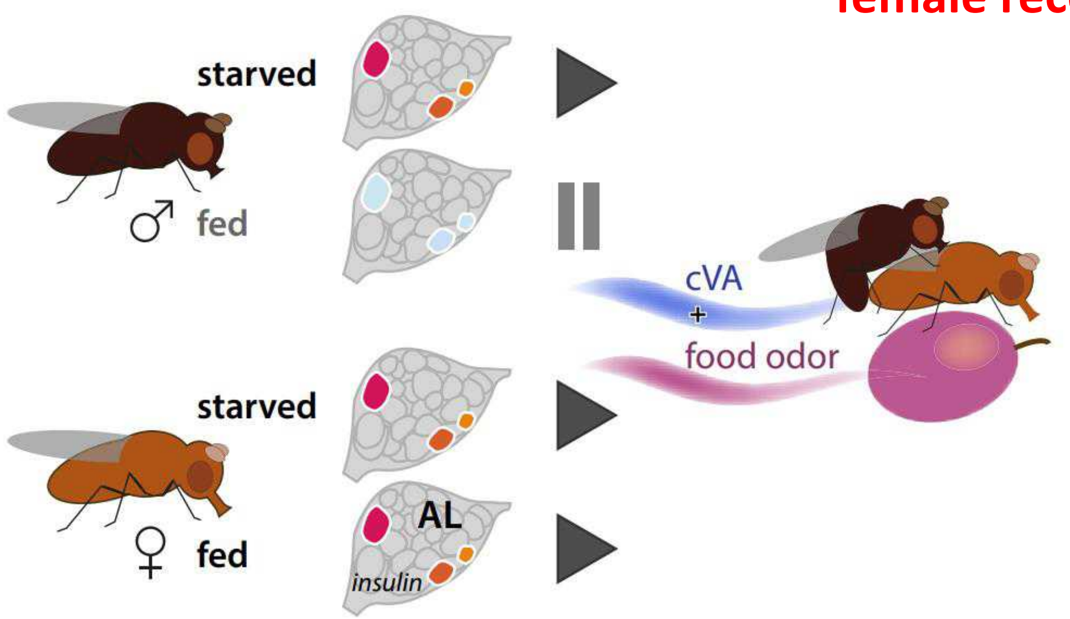
OPEN

Feeding regulates sex pheromone attraction and courtship in *Drosophila* females

Received: 11 May 2015
Accepted: 20 July 2015
Published: 10 August 2015

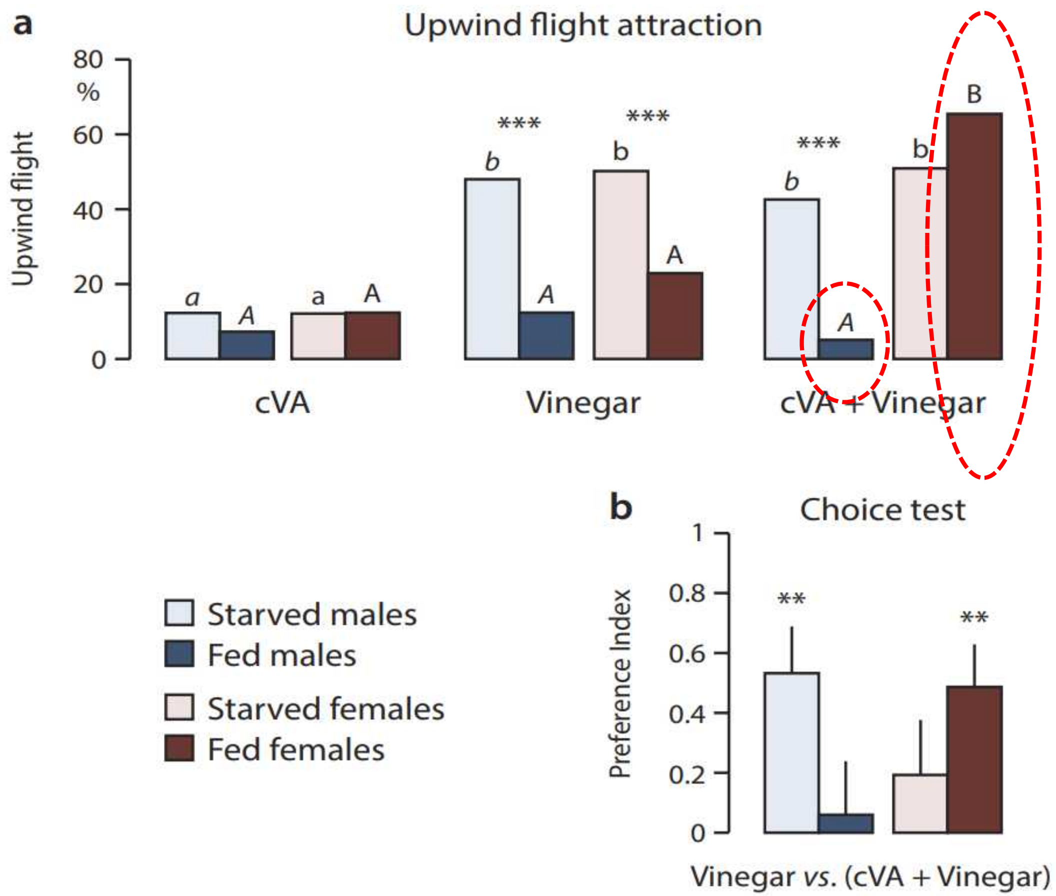
Sébastien Lebreton[1,2,*], Federica Trona[1,2,*], Felipe Borrero-Echeverry[1,3], Florian Bilz[2], Veit Grabe[2], Paul G. Becher[1], Mikael A. Carlsson[4], Dick R. Nässel[4], Bill S. Hansson[2], Silke Sachse[2] & Peter Witzgall[1]

Food odor promotes female receptivity



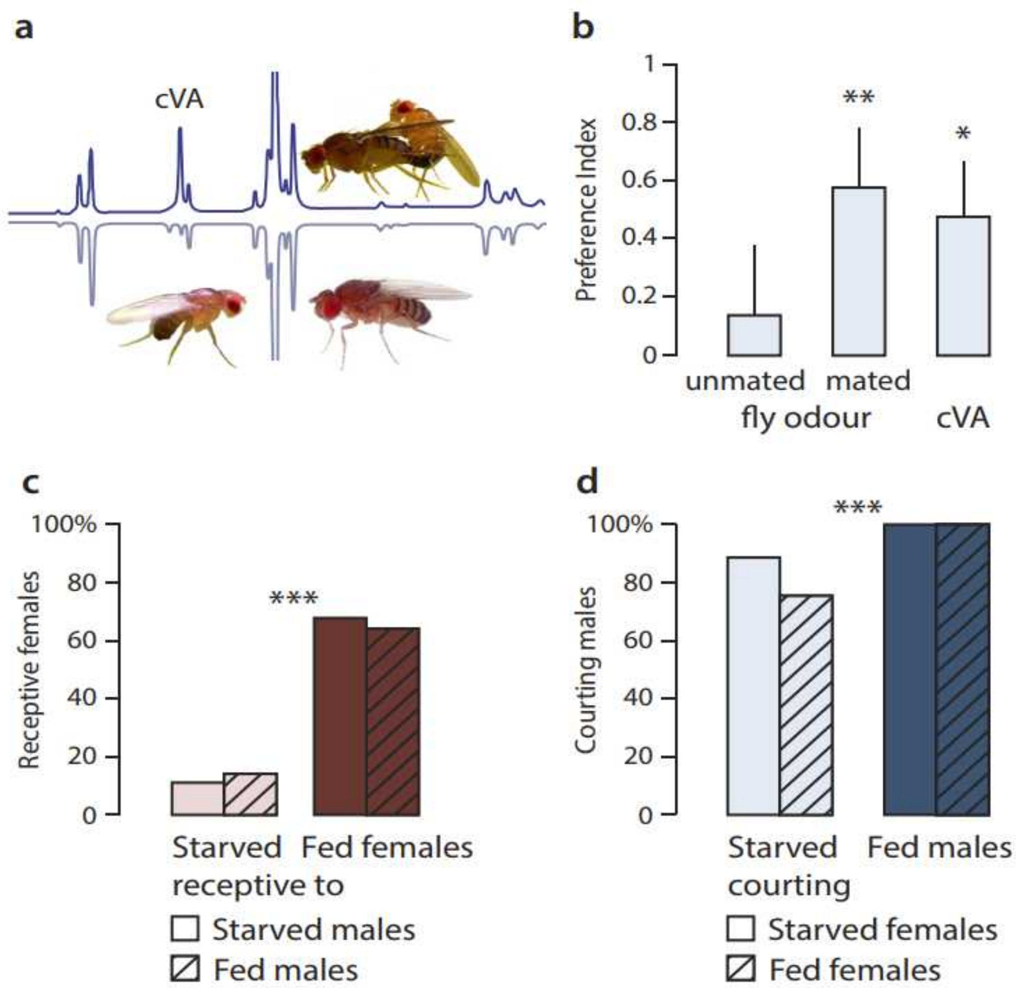
Lebreton, S., et al. (2015)

cVA enhanced upwind flight attraction of fed females to vinegar



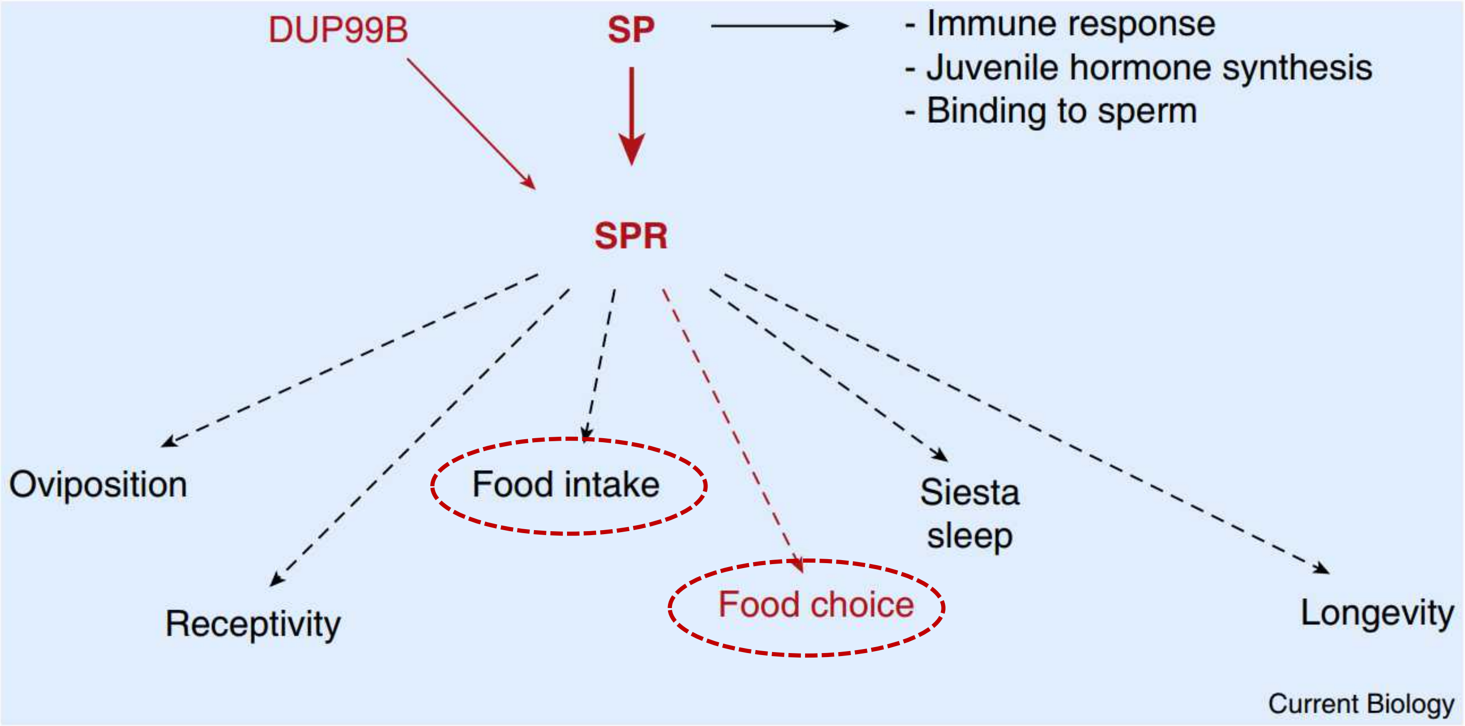
Lebreton, S., et al. (2015)

Food intake has a sex-specific effect on pheromone attraction



Lebreton, S., et al. (2015)

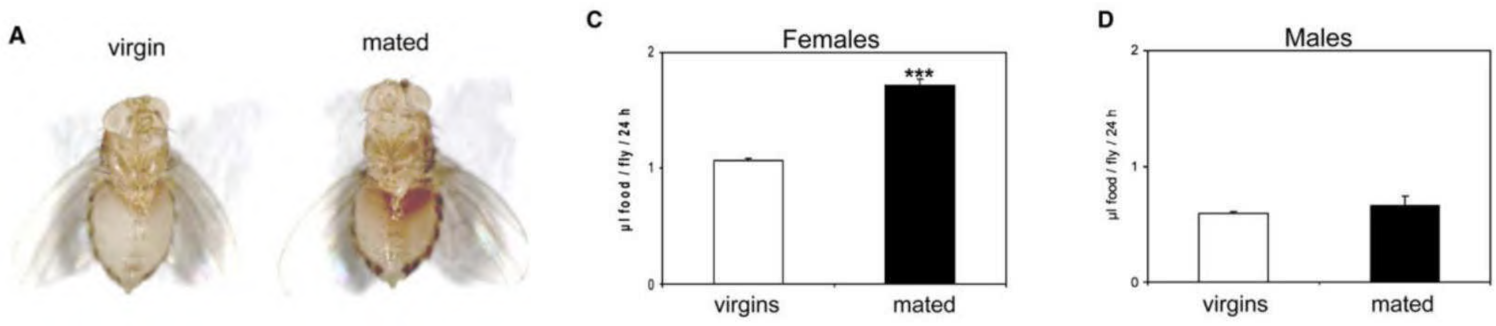
Post-mating responses elicited by sex peptide (SP) and DUP99B via the sex peptide receptor (SPR)



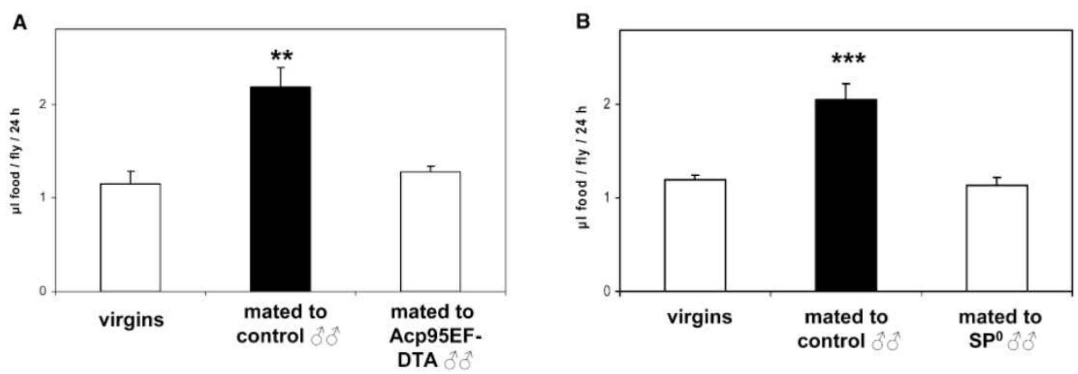
Kubli, E. (2010)

Mated females have enhanced food intake

Mating Stimulates Female Food Intake

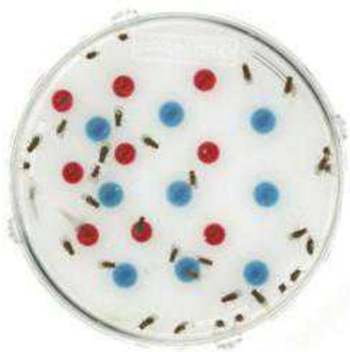


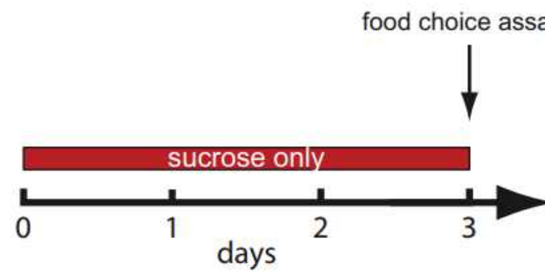
SP affects food intake

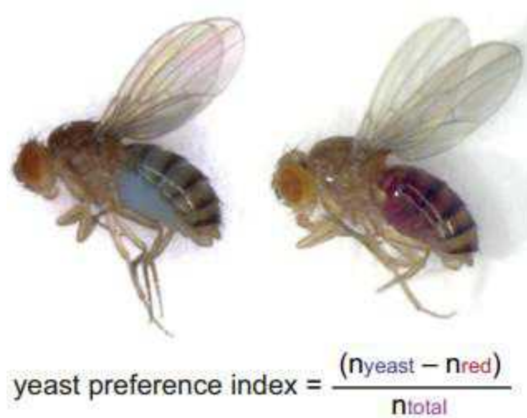


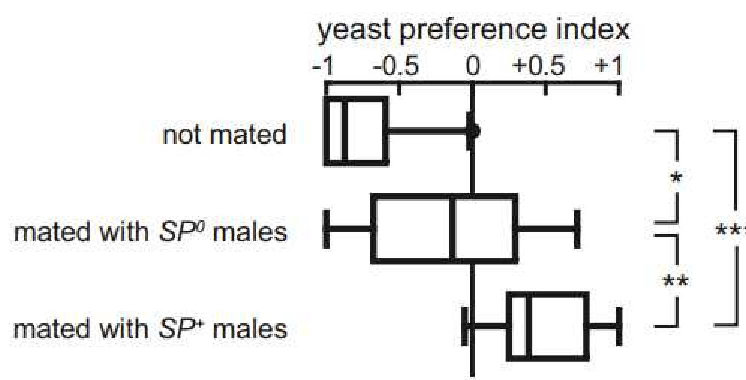
Carvalho, G. B., et al. (2006)

Mating status affects female feeding decisions via SPR signaling





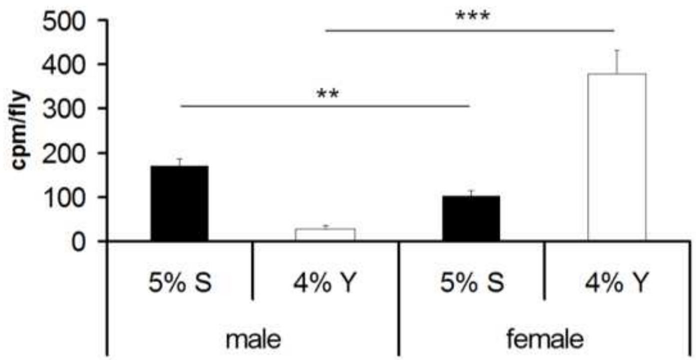




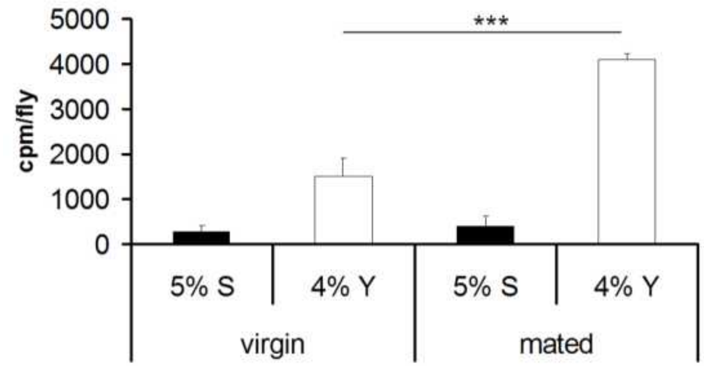
Ribeiro, C. and B. J. Dickson (2010)

Mated females change their tastes

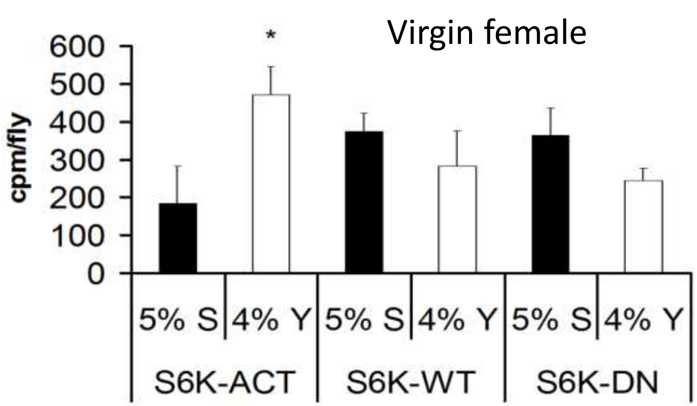
Males like sucrose & Females like yeast

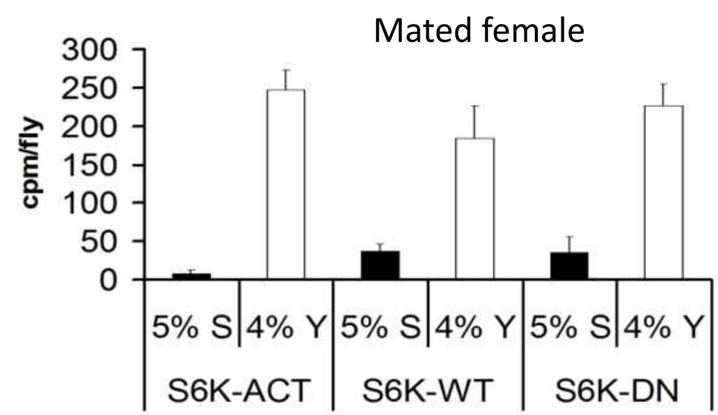


Mated females eat more yeast



S6K activation in neuronal cells enhances ingestion of food with a higher ratio of protein to sugar in unmated flies.





Vargas, M. A., et al. (2010)

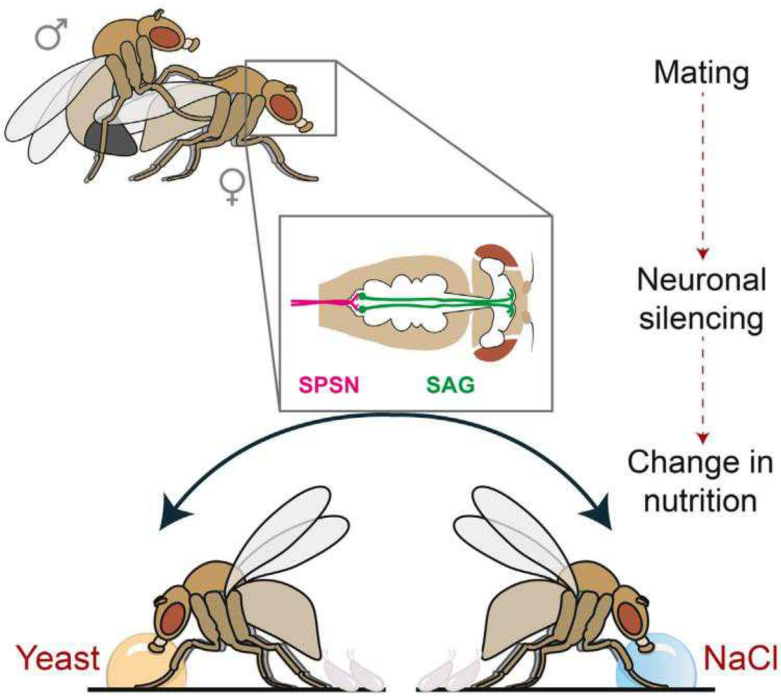
Article

Current Biology

Postmating Circuitry Modulates Salt Taste Processing to Increase Reproductive Output in *Drosophila*

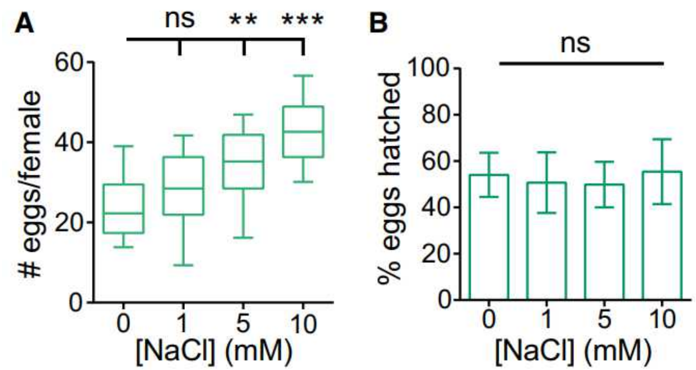
Authors

Samuel James Walker, Verónica María Corrales-Carvajal, Carlos Ribeiro

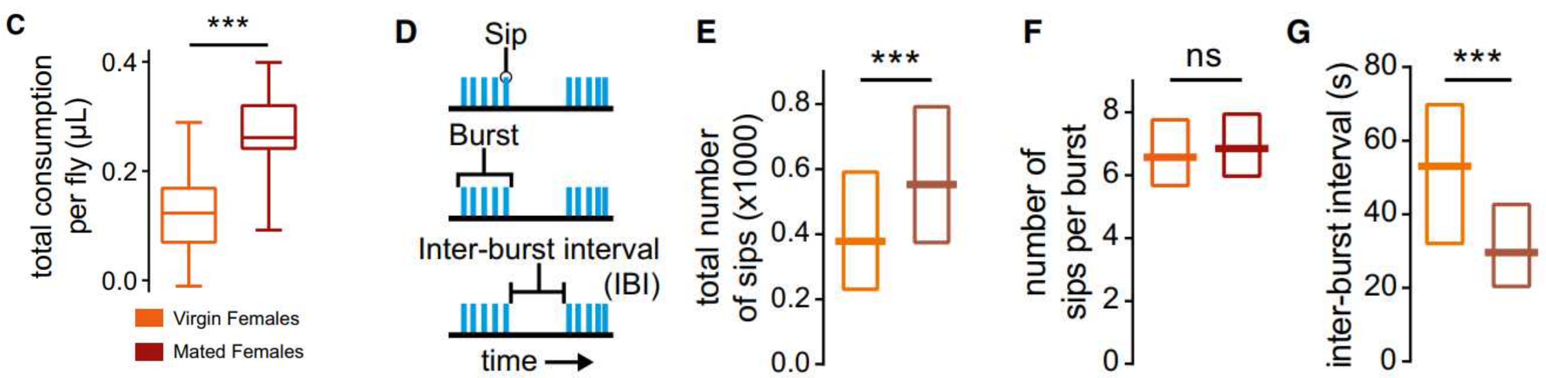


Walker, S. J., et al. (2015)

Dietary salt enhances reproductive output and mating drives a salt appetite



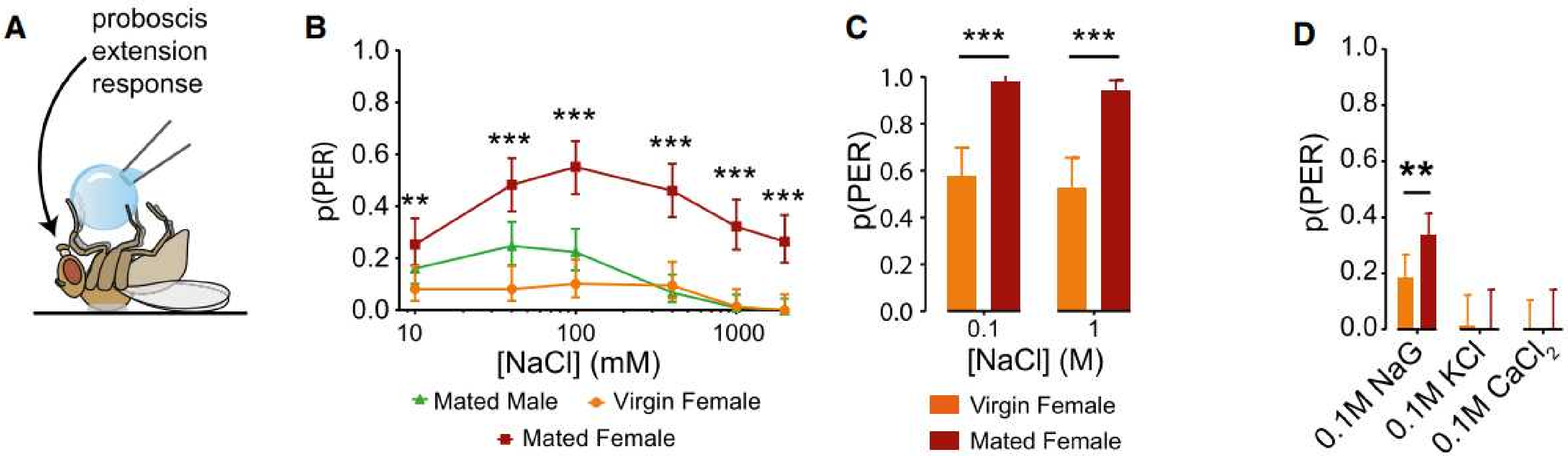
NaCl stimulates egg laying



Walker, S. J., et al. (2015)

Mating drives increased salt intake

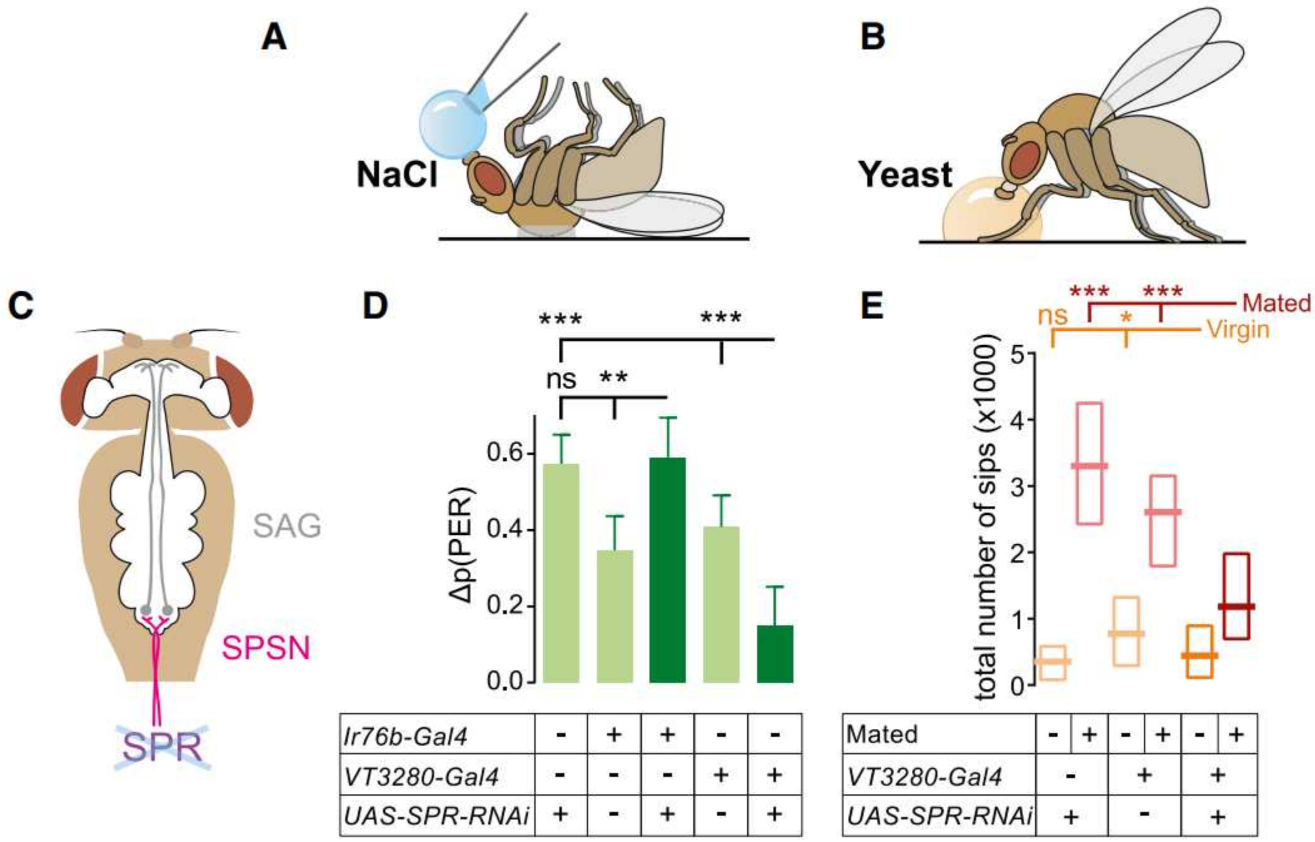
Mating modulates gustatory response to sodium



This salt appetite was specific to sodium

Walker, S. J., et al. (2015)

SPR silences postmating circuitry to drive salt and yeast appetites

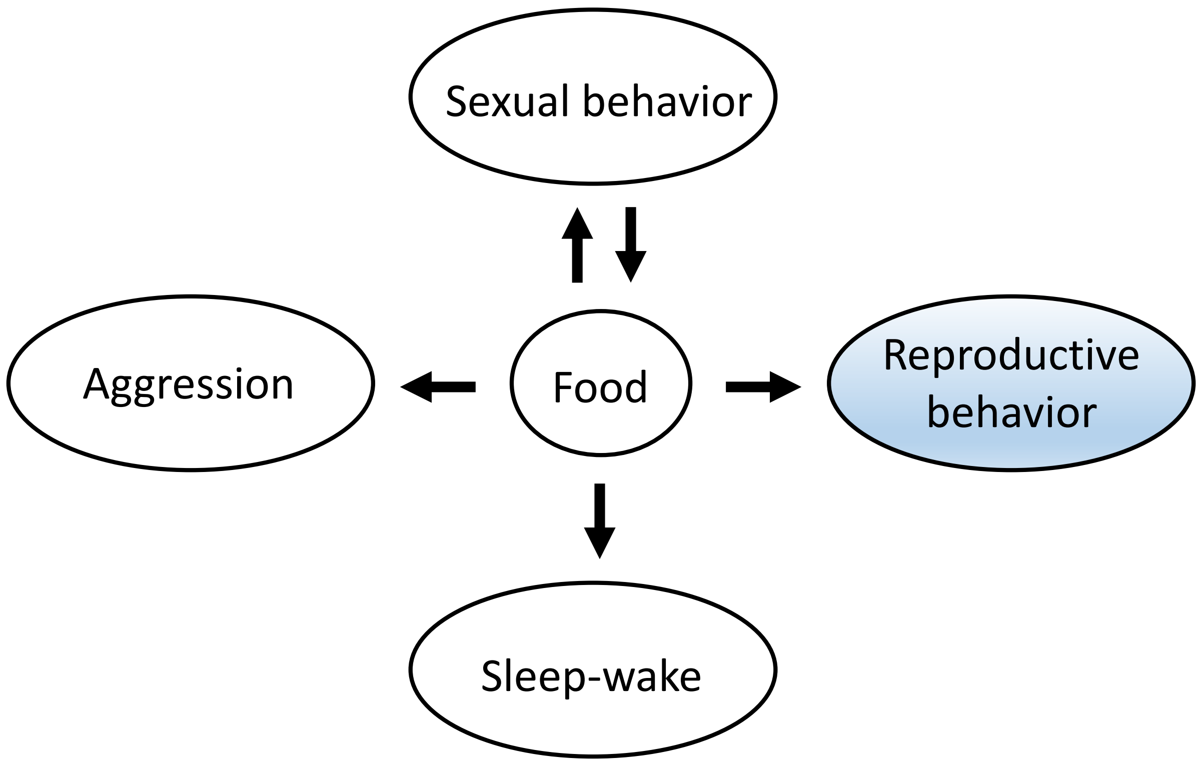


Silencing of SPSN or SAG activity is sufficient to induce the postmating salt and yeast appetites.

Walker, S. J., et al. (2015)

- Food odor promote male courtship and female receptivity.
- Mated female flies prefer yeast and salt appetites.

Connections between food and different behaviors

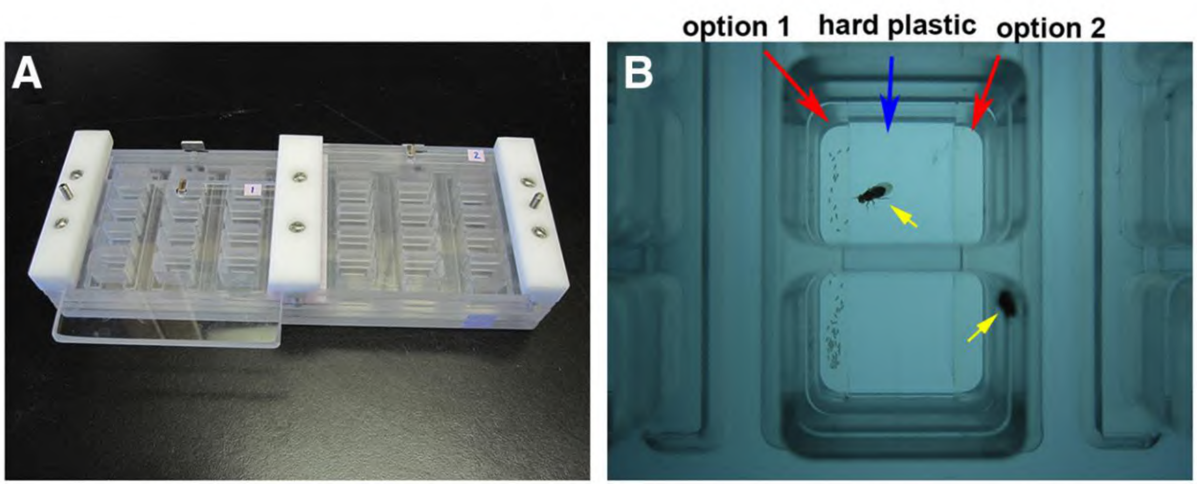


1396 • The Journal of Neuroscience, January 28, 2015 • 35(4):1396–1410

Behavioral/Cognitive

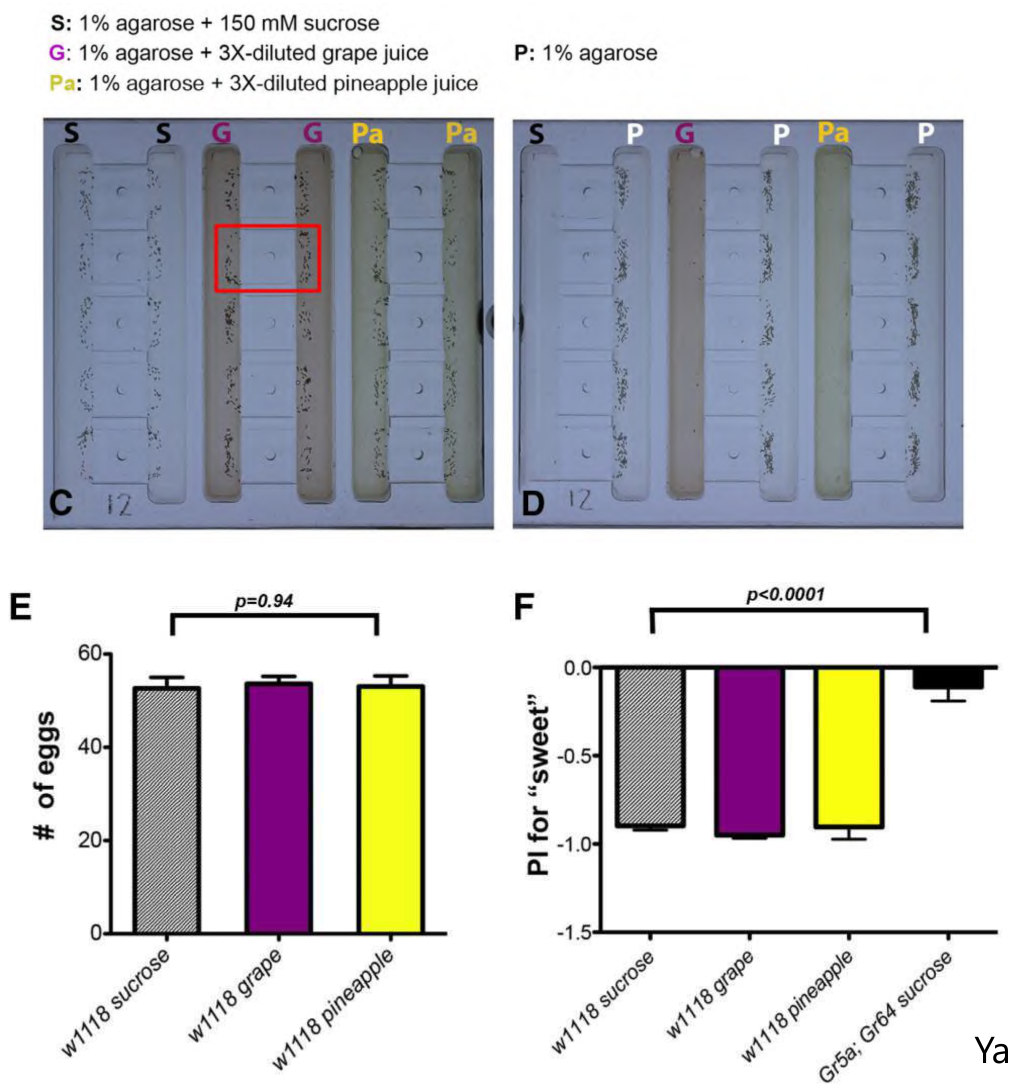
Behavioral and Circuit Basis of Sucrose Rejection by *Drosophila* Females in a Simple Decision-Making Task

Chung-Hui Yang,[1] Ruo He,[1] and Ulrich Stern[2]
[1]Department of Neurobiology, Duke University Medical School, Durham, North Carolina 27710 and [2]Yang Laboratory, Durham, North Carolina 27705



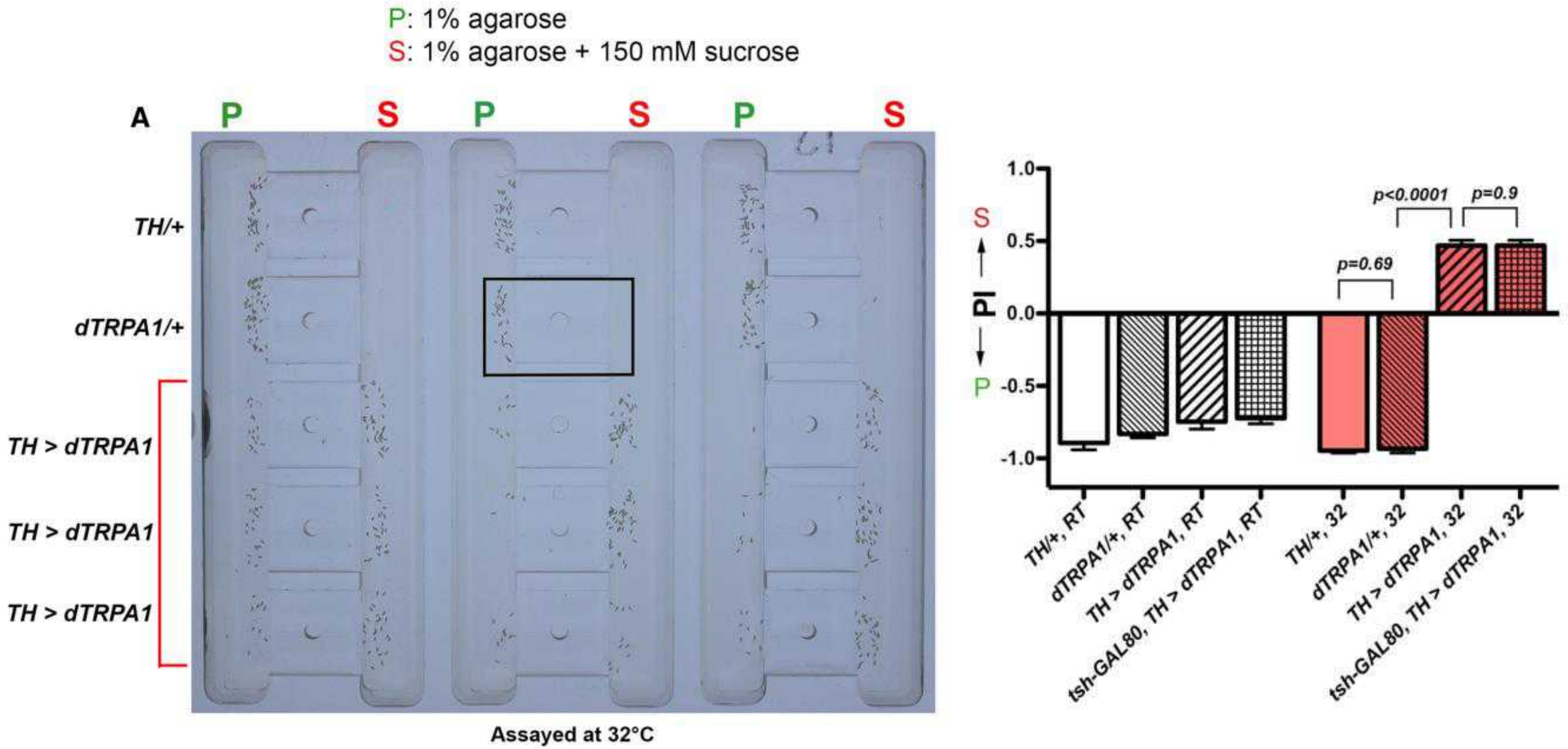
Yang, C. H., et al. (2015)

Drosophila females preferred laying eggs on the nonsweet substrates over the sweet ones



Yang, C. H., et al. (2015)

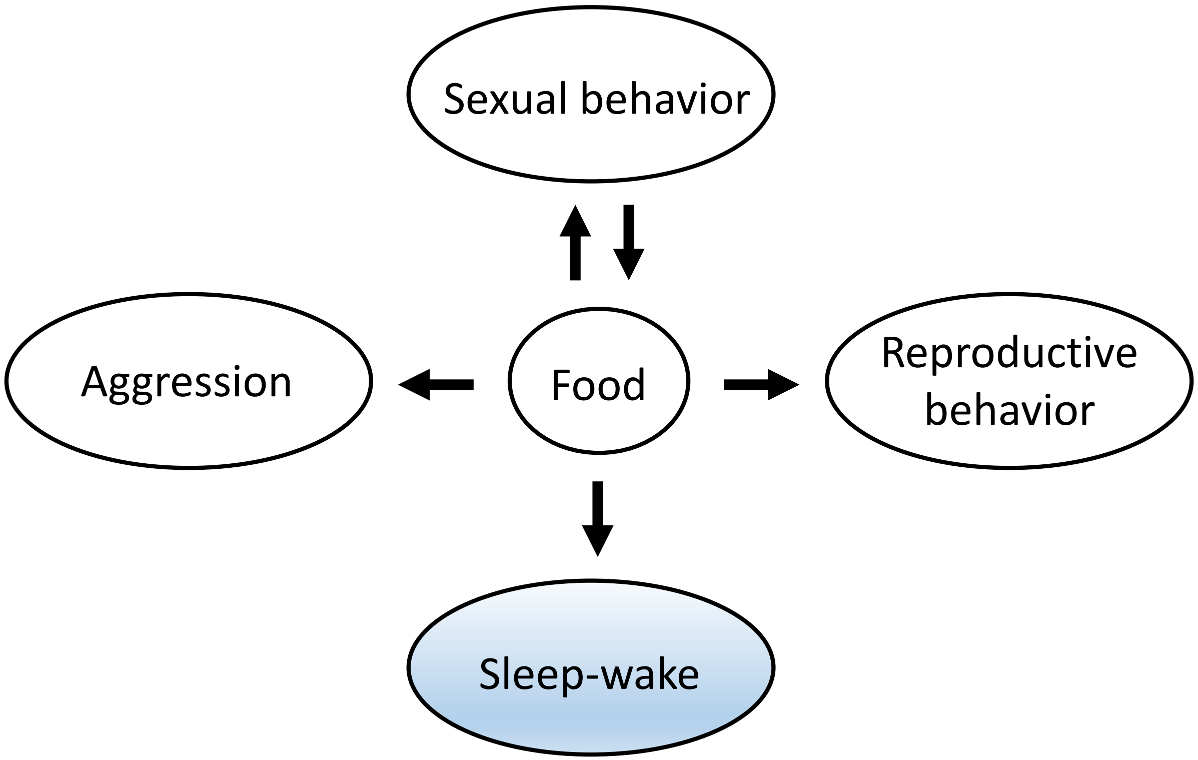
Activating the *TH-GAL4*-expressing neurons triggered a preference for laying eggs on the sucrose substrate



A specific subset of DA neurons, but not MB, mediate egg laying decision-making task.

Yang, C. H., et al. (2015)

Connections between food and different behaviors



www.impactaging.com AGING, August 2010, Vol. 2. No 8

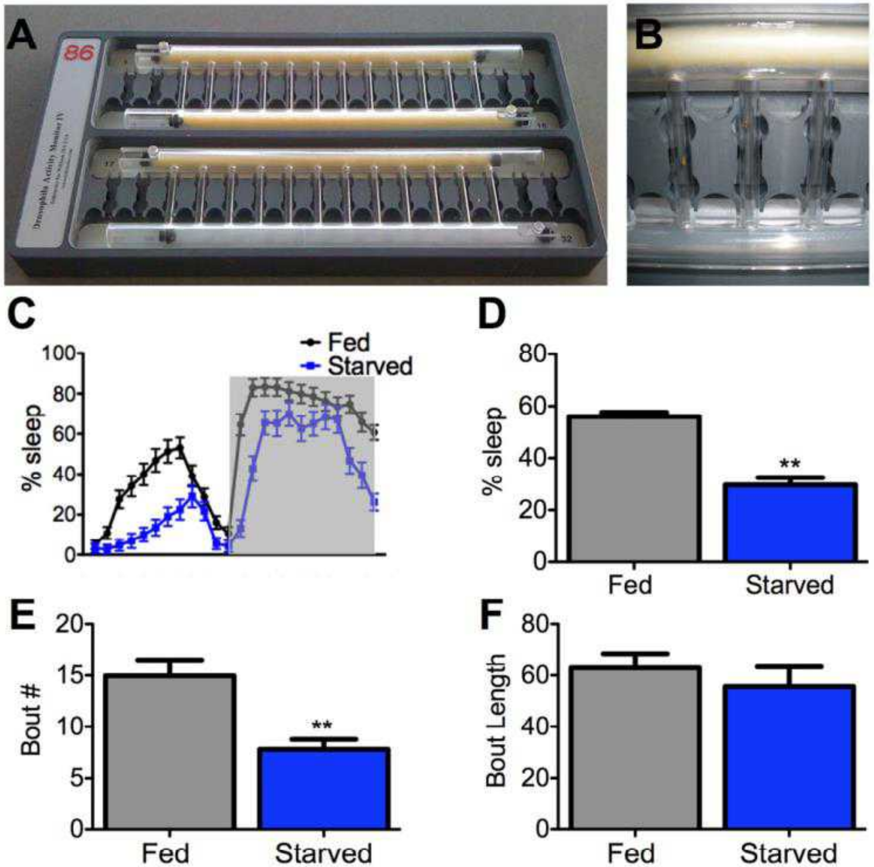
Research Perspective

The sleep-feeding conflict: Understanding behavioral integration through genetic analysis in Drosophila

Daniel M. McDonald and Alex C. Keene

Department of Biology, New York University, New York, NY 10003, USA

Starvation impairs sleep initiation but not maintenance



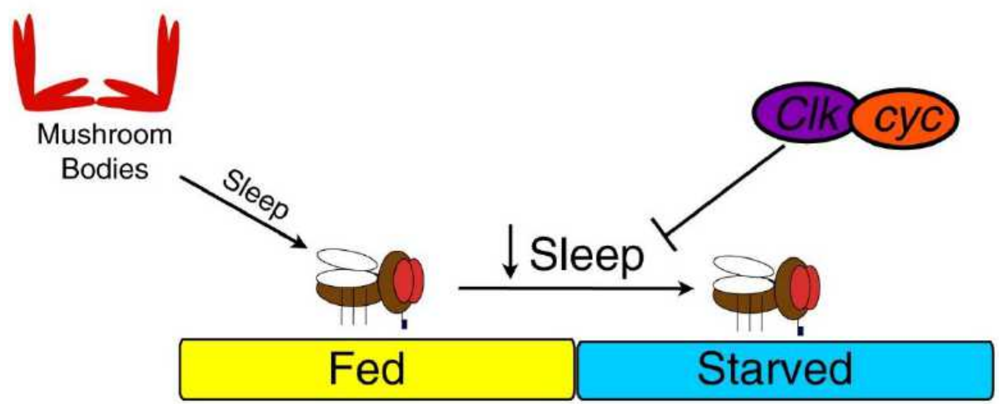
McDonald, D. M. and A. C. Keene (2010)

Current Biology *20*, 1209–1215, July 13, 2010 DOI 10.1016/j.cub.2010.05.029

Report

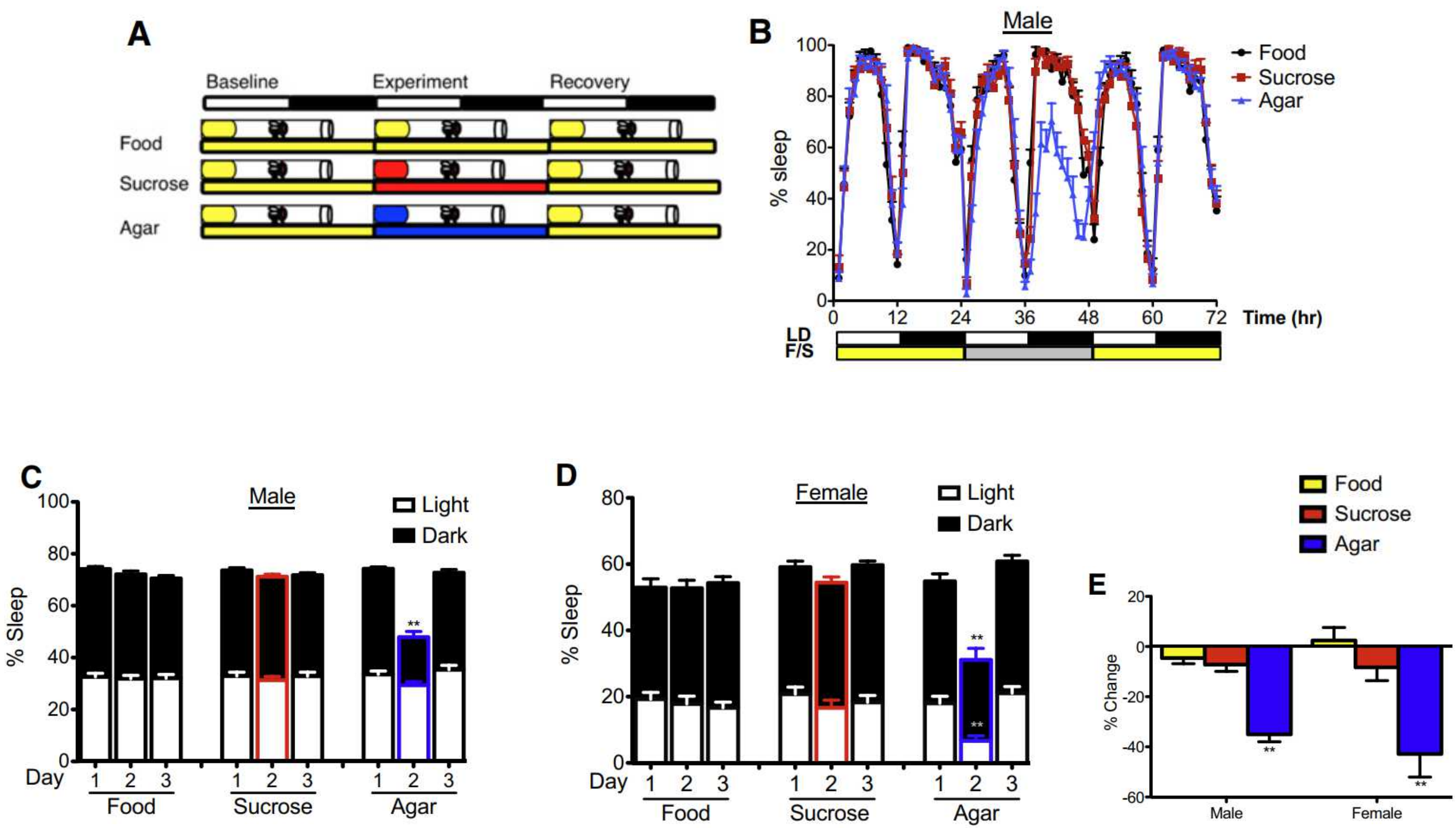
Clock and *cycle* Limit Starvation-Induced Sleep Loss in *Drosophila*

Alex C. Keene,[1,*] Erik R. Duboué,[1] Daniel M. McDonald,[1]
Monica Dus,[2] Greg S.B. Suh,[2,4] Scott Waddell,[3,4]
and Justin Blau[1,4]
[1]Biology Department, New York University, New York, NY 10003, USA
[2]Skirball Institute for Biomolecular Medicine, New York University School of Medicine, New York, NY 10016, USA
[3]Department of Neurobiology, University of Massachusetts Medical School, Worcester, MA 01605, USA



Keene, A. C., et al. (2010)

Food Deprivation Suppresses Sleep



Keene, A. C., et al. (2010)

OPEN ACCESS Freely available online

PLoS one

Dietary Modulation of *Drosophila* Sleep-Wake Behaviour

James H. Catterson[1], Seymour Knowles-Barley[2], Katherine James[1], Margarete M. S. Heck[1], Anthony J. Harmar[1], Paul S. Hartley[1]*

1 Centre for Cardiovascular Science, Queen's Medical Research Institute, The University of Edinburgh, Edinburgh, Scotland, 2 School of Informatics, The University of Edinburgh, Edinburgh, Scotland

Diet impact upon sleep and wakefulness:

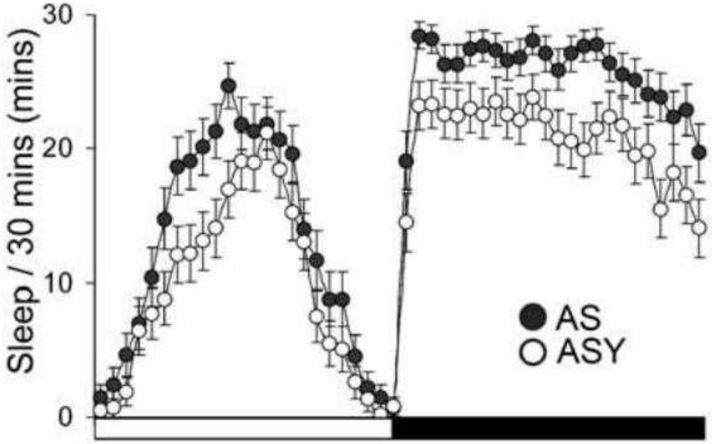
- Yeast promotes arousal from sleep in males and shortening periods of locomotor activity in females.

- Higher dietary sucrose leads to reduced total sleep by male but not female flies.

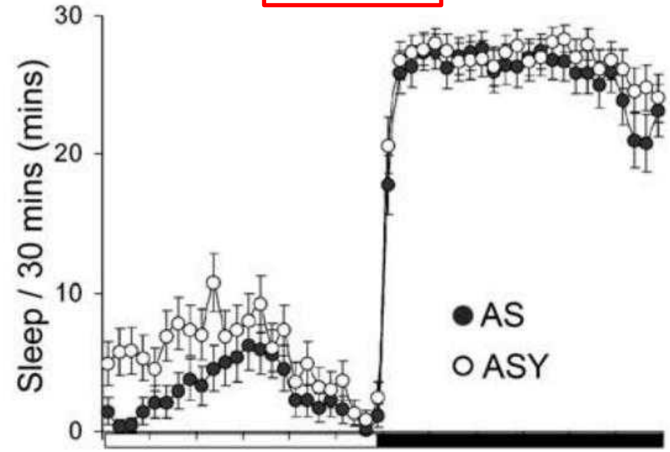
Catterson, J. H., et al. (2010)

Different effects of yeast on sleep-wake behavior of male and female flies

male

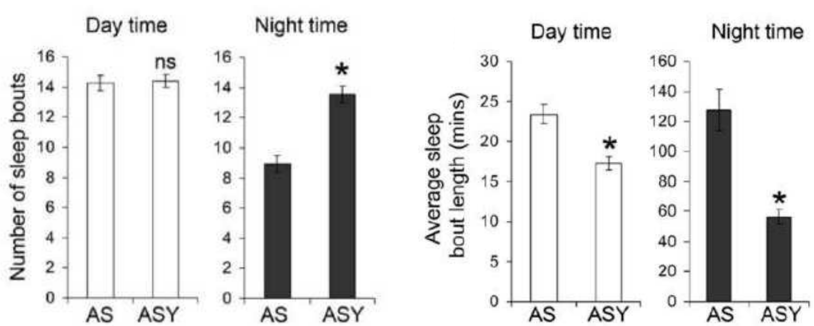


female



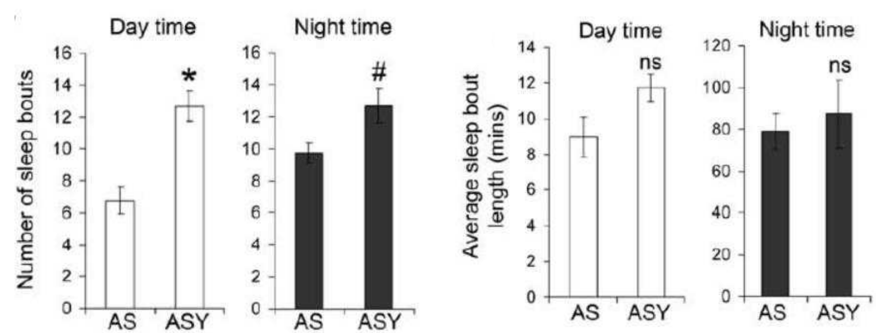
AS: Agar+Sucrose

ASY: Agar+Sucrose+Yeast



Bouts number

Bout length

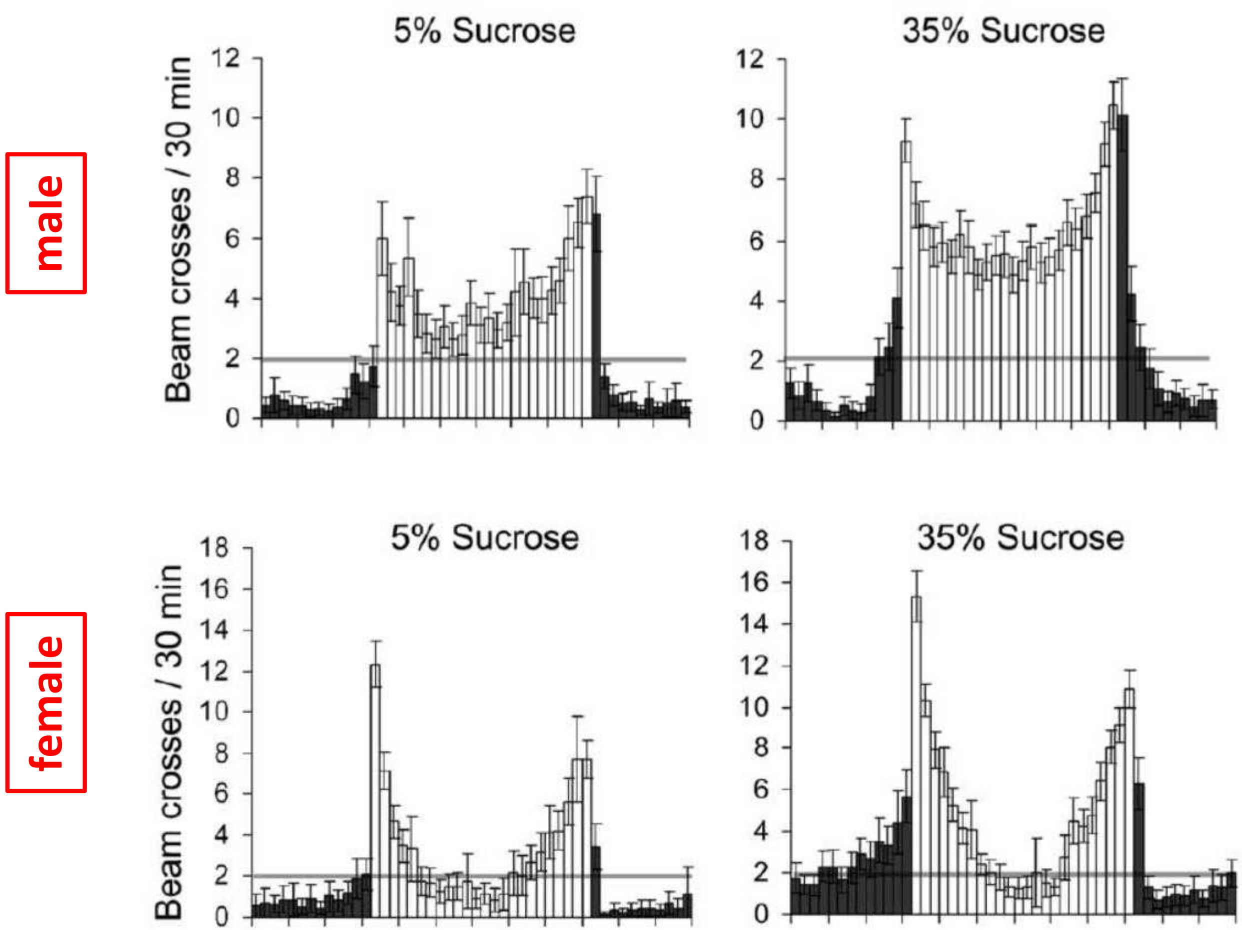


Bouts number

Bout length

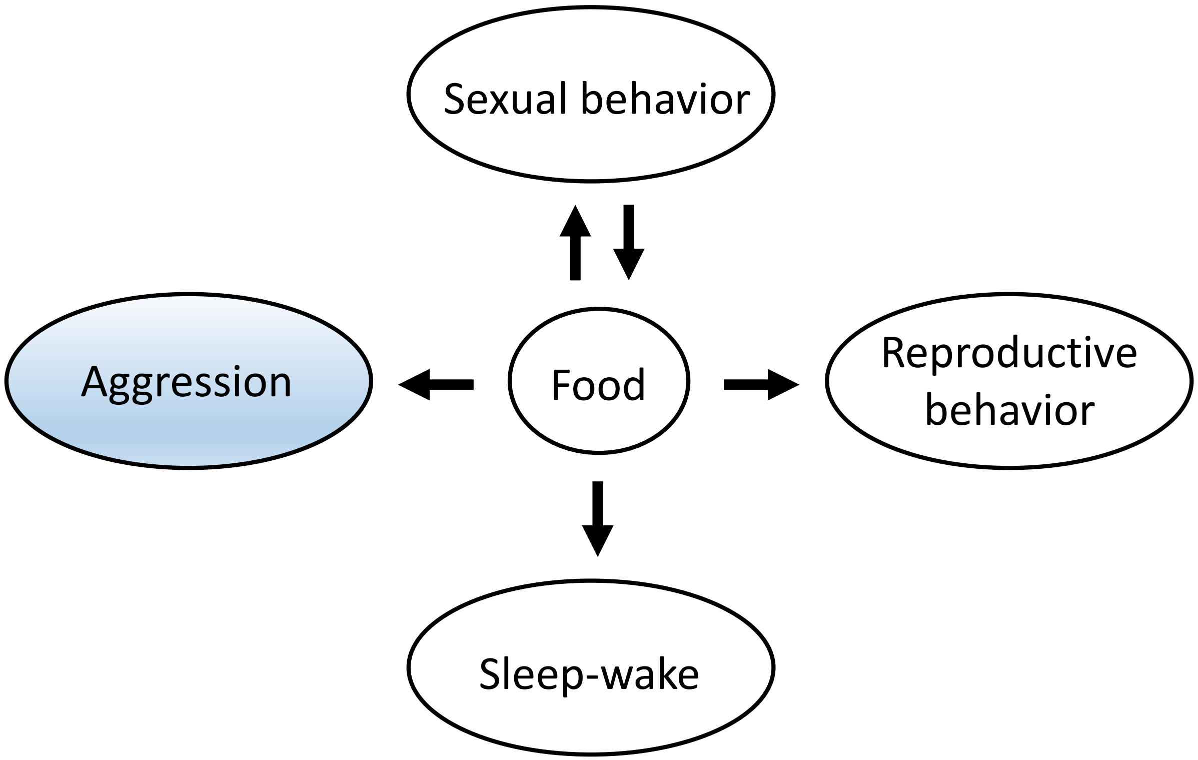
Catterson, J. H., et al. (2010)

Different effects of sucrose on sleep-wake behavior of male and female flies



Catterson, J. H., et al. (2010)

Connections between food and different behaviors



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How Food Controls Aggression in *Drosophila*

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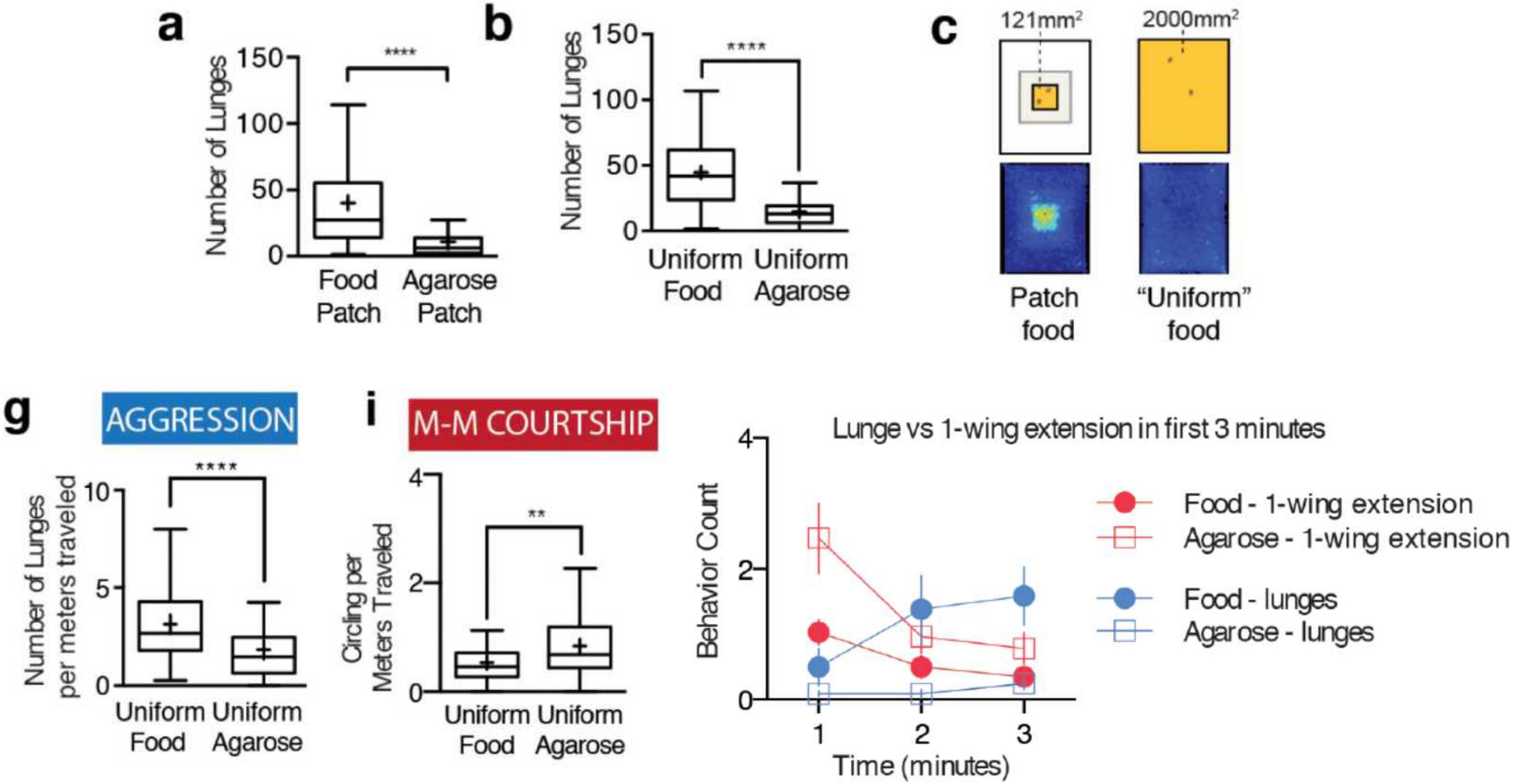
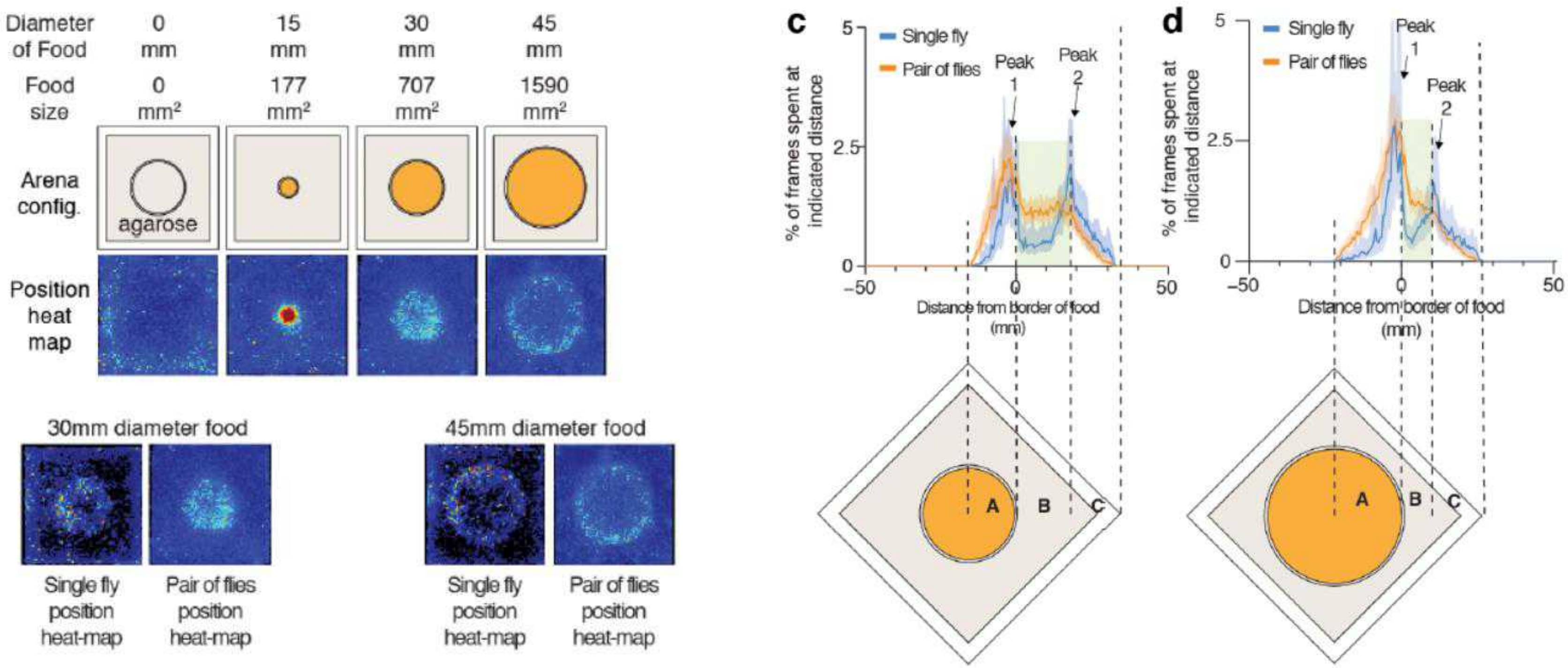
Lim, R. S., et al. (2014)

Food is necessary for normal levels of male-male aggression



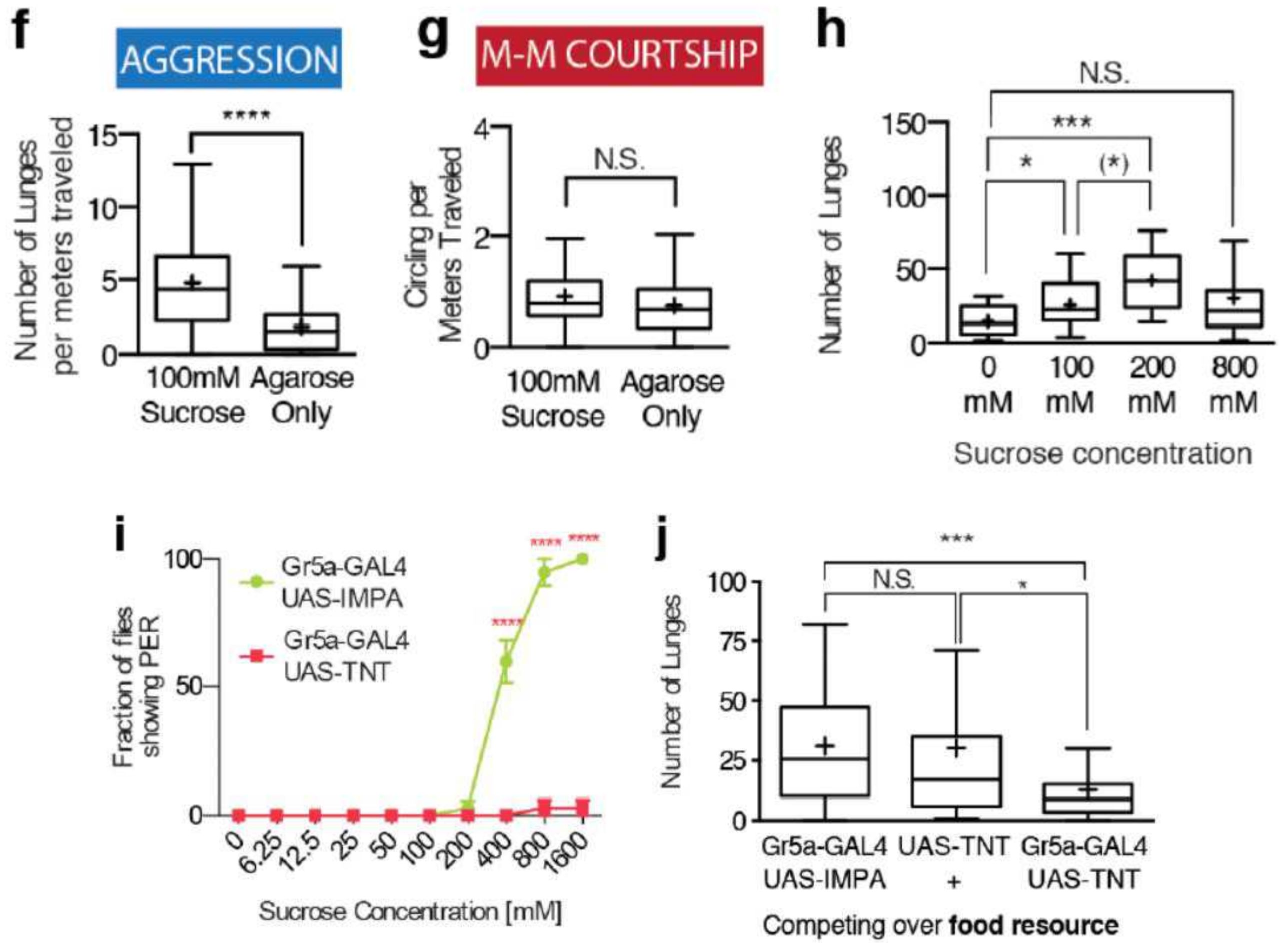
Lim, R. S., et al. (2014)

Flies display territorial behavior



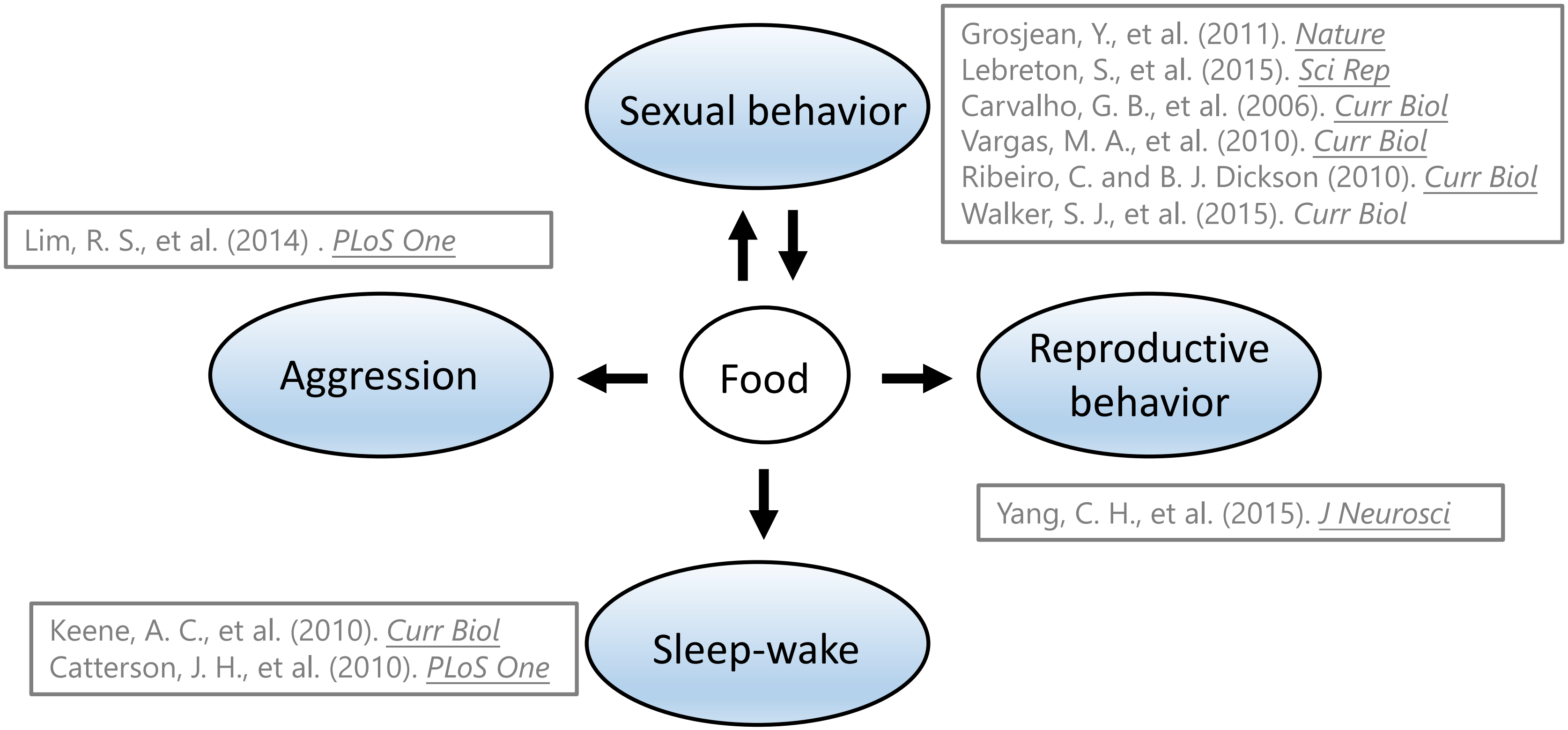
Lim, R. S., et al. (2014)

Flies use sweet-sensing Gr5a+ GRNs to detect the concentration of sucrose in food and tune the level of aggression accordingly



Lim, R. S., et al. (2014)

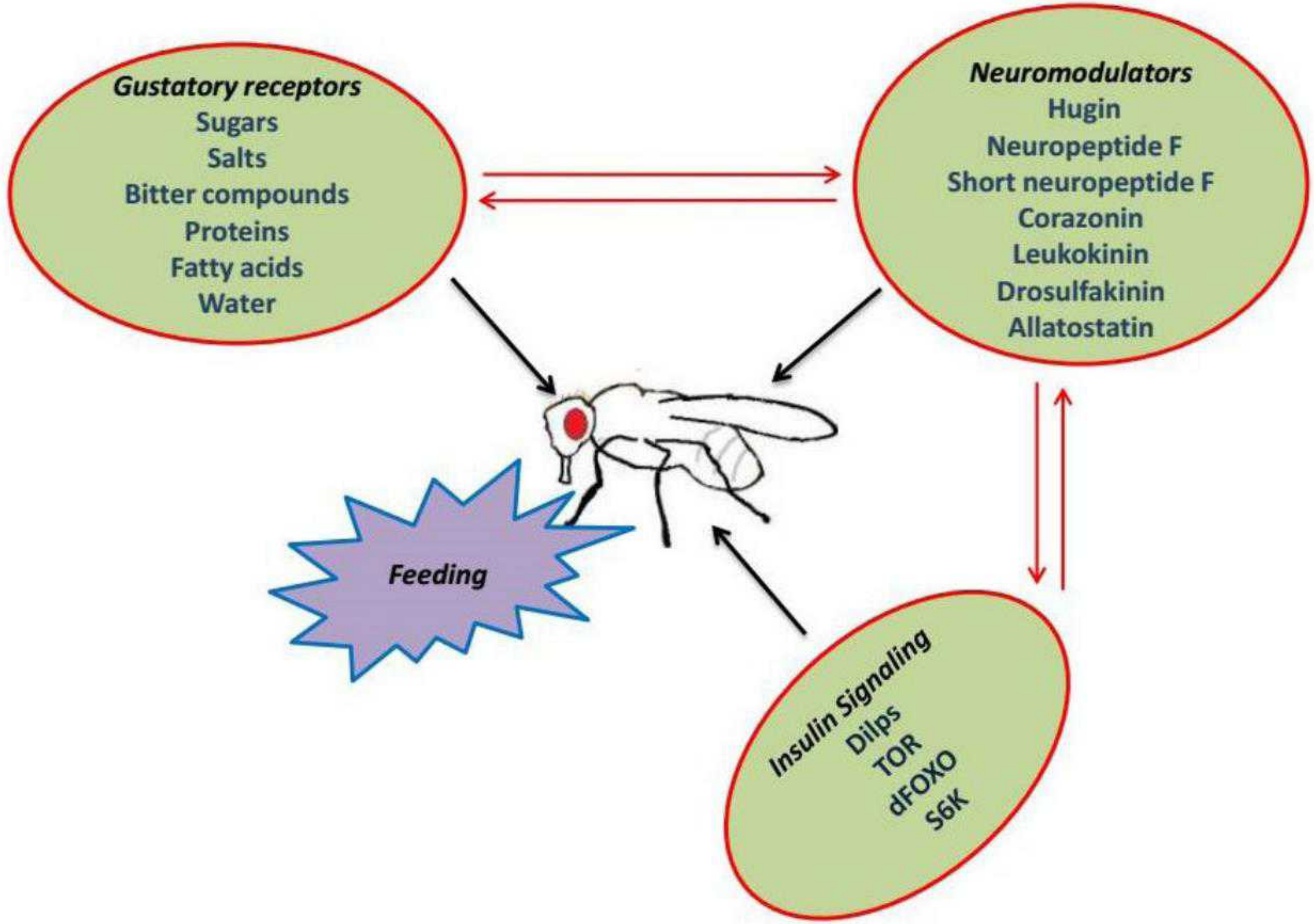
Connections between food and different behaviors



Summary

- Food odor promotes male courtship and female receptivity.
- Mated female flies prefer yeast and salt appetites.
- Female flies suppress laying eggs on the sucrose substrate.
- Food Deprivation Suppresses Sleep.
- Different diet affect sleep and wakefulness.

Thank you for listening！


Gustatory receptors
Sugars
Salts
Bitter compounds
Proteins
Fatty acids
Water
Neuromodulators
Hugin
Neuropeptide F
Short neuropeptide F
Corazonin
Leukokinin
Drosulfakinin
Allatostatin
Feeding
Insulin Signaling
Dilps
TOR
dFOXO
S6K