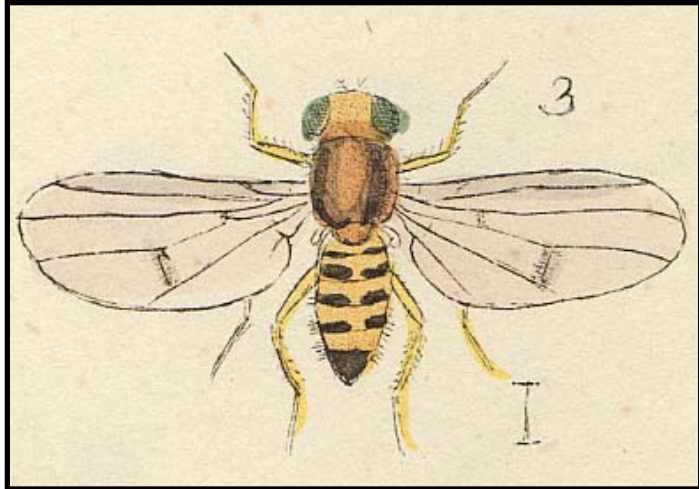
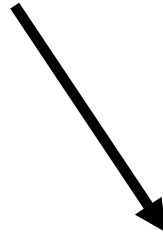


FLAME: using Flies in a Mine to understand deep underground metabolism.



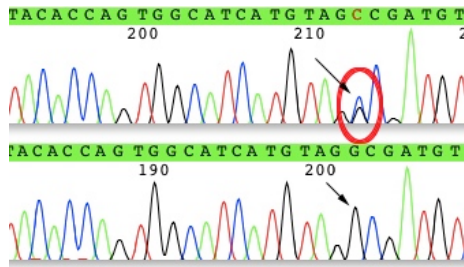
Thomas Merritt and John Hick

 @tjsmerritt



LaurentianUniversity
Université **Laurentienne**

Path from Genetic Variation to Biological Complexity?

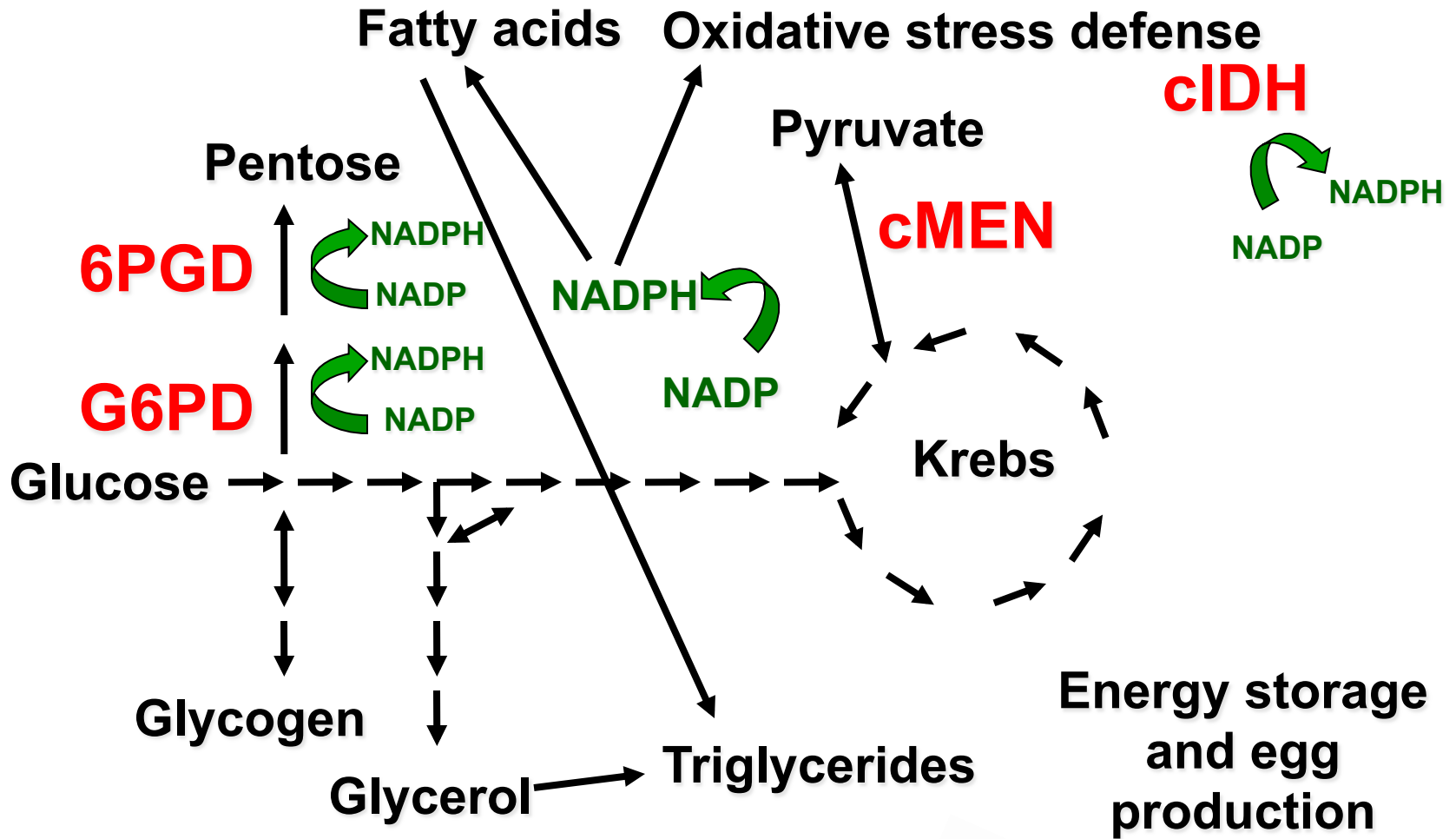


Genotype

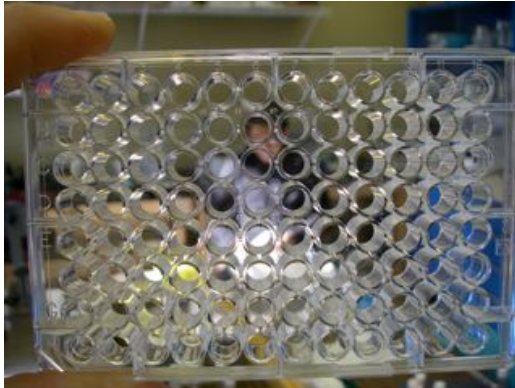
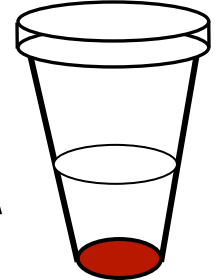


Phenotype

NADP(H) Network



Whole fly Homogenization



Whole-fly homogenates
Quick, Dirty – and accurate

Slope		Kinetic												Kinetic+		
		1	2	3	4	5	6	7	8	9	10	11	12	Time:	Interval:	Reads:
A	5.474	7.923	15.306	5.989	10.328	4.737	10.705	14.493	1.598	6.816	9.277			3:00	0:09	21
B	13.362	3.481	7.489	8.392	7.873	10.040	10.840	12.579	7.945	7.932	11.724			Lm1	320	
C	10.162	8.988	10.695	3.912	3.631	3.915	12.020	8.996	5.844	8.586	8.617			Autonix: Once	Calibrate: Once	Column Priority
D	11.573	7.102	12.303	8.303	11.103	9.279	10.880	14.579	8.802	12.965	7.400			Lag Time: 0.00	End Time: 3:00	OD Min: 0
E	4.510	4.208	3.633	8.998	8.677	6.346	7.090	7.075	11.177	7.792	11.930			OD Max: 0.04		
F	4.257	9.516	8.768	10.413	10.189	8.865	13.757	7.622	7.872	14.259				Plate Last Read:		
G	7.791	7.263	9.876	7.004	12.020	4.624	10.464	9.420	9.762	3.018				5:51 PM	2/13/2012	
H	8.845	3.798	8.270	8.817	8.022	6.068	7.665	14.107	5.761	9.401						

Wavelength Combination: Lm1
 Temperature Set Point: 25.0 Mean 25.0 Range 25.0 - 25.0
 Reader: PLUS384 ROM v1.21 Aug 18 2005

Broad-Based Metabolomics

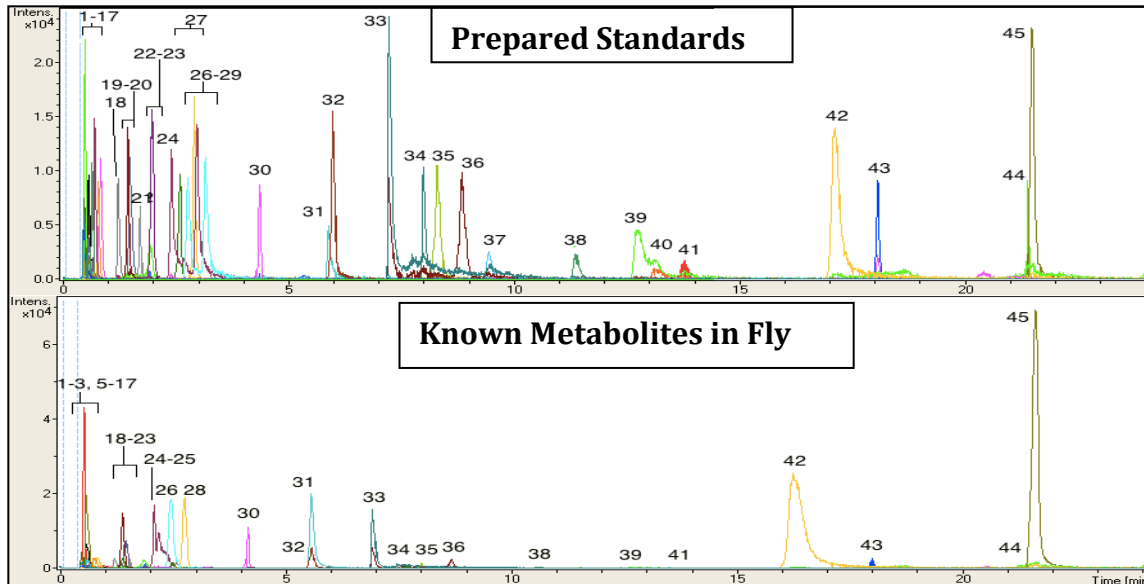


Liquid chromatography / mass spectrometry based metabolomics

LC separates complex biological sample into individual metabolites

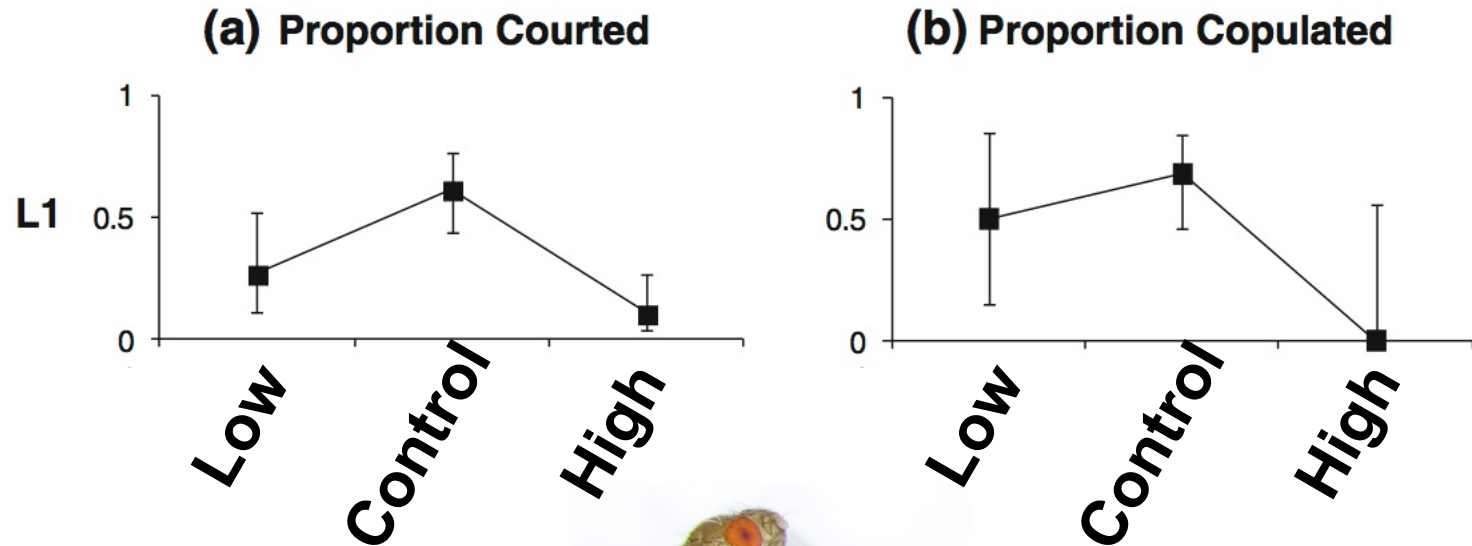
Mass spec identifies metabolites based on extremely accurate molecular weight

No, its not that easy



45 known metabolites as standards and in fly homogenate

Flies and Pressure



Boom chicka wah wah

Flies respond to atmospheric pressure

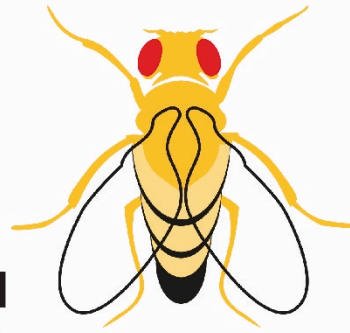
Mining and Metabolism



**Working deep underground is a physical stress.
How does working deep underground change
metabolism?**

FLY ME

FLIES IN A MINE



Won a Nobel Prize



Allowed others to win 4 Nobel Prizes

Use the fly model system to explore the metabolic effects of working deep underground

Underground Metabolism

12 groups of 10 flies:

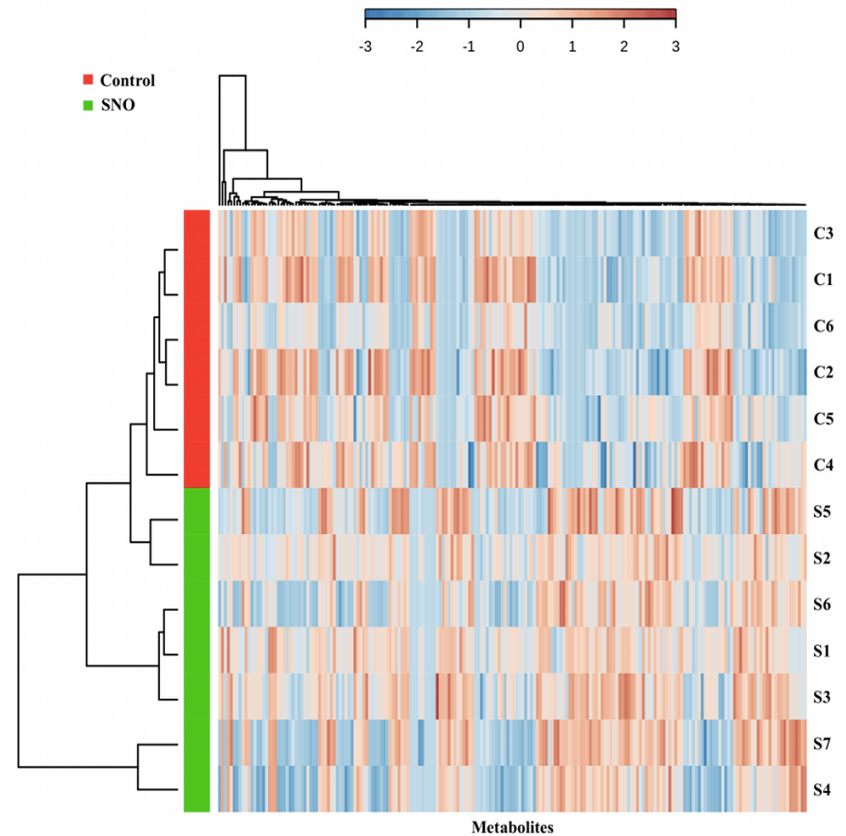
6 control, 6 experimental

15% of metabolism changes:

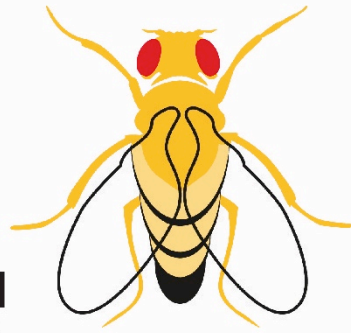
237 of 1514 metabolites

23 metabolites are only found
in control or treatment

We can identify 6



FLIES IN A MINE



**Metabolism changes with time
deep underground**

Mining is stressful

How do we minimize this?



Cue the CBC



We have a full machine shop

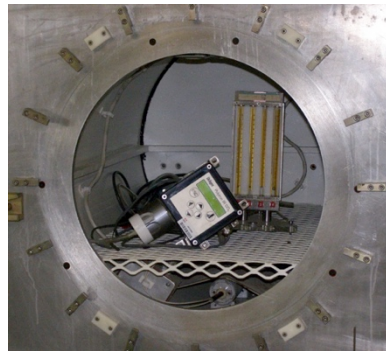


3:30am wakeup

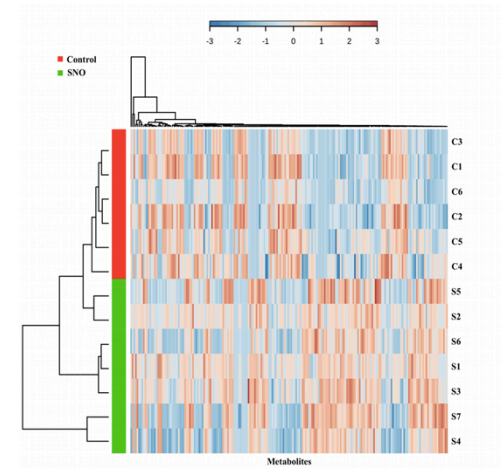
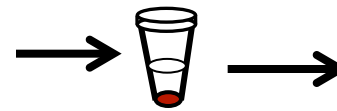
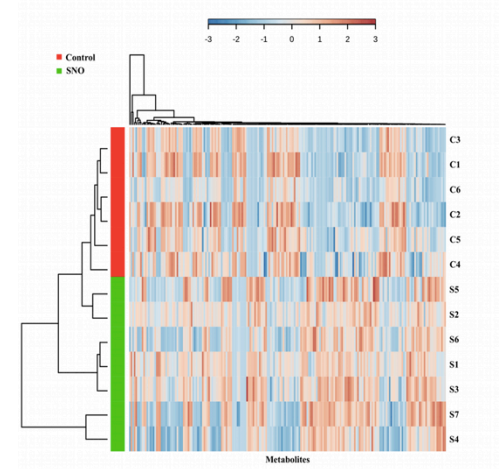
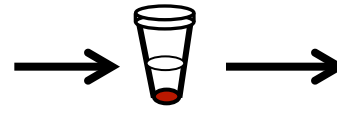
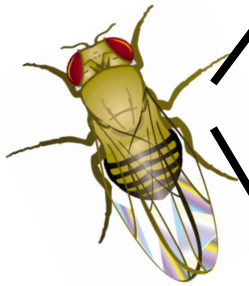
Metabolomics



SNOLAB

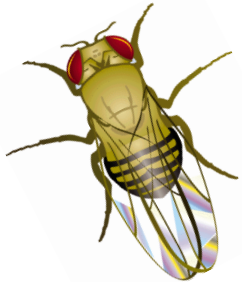


Lab - Pressure

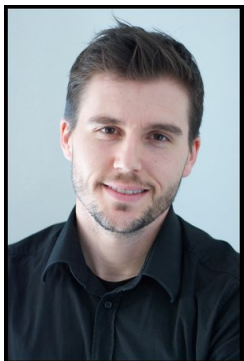


Biochemistry and Gene Expression

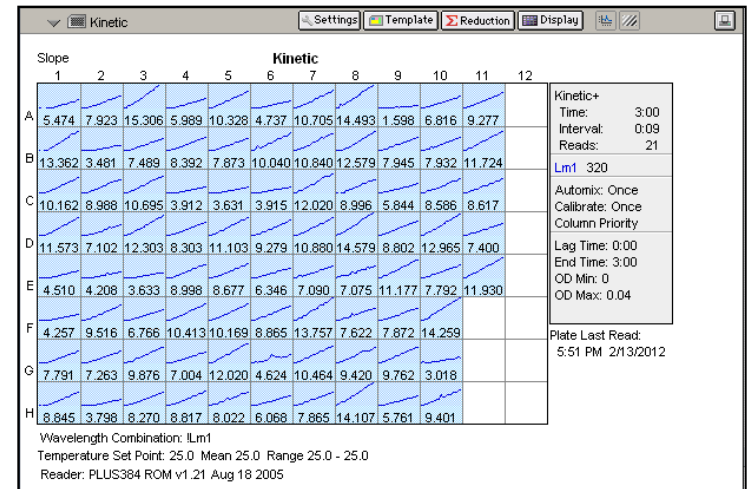
SNOLAB



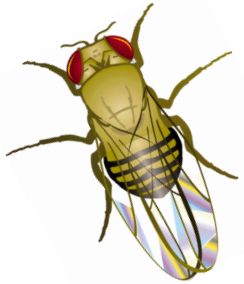
Quantifying a suite of genes and metabolites



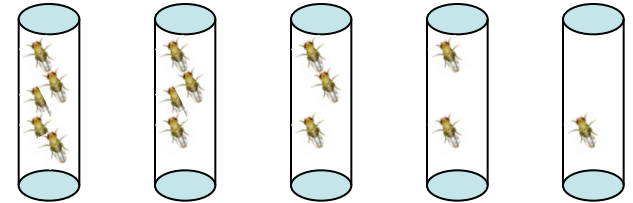
Heath MacMillan
Carleton University



Longevity



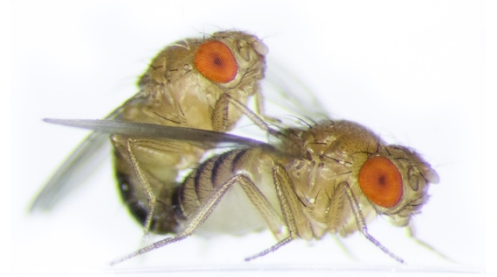
SNOLAB



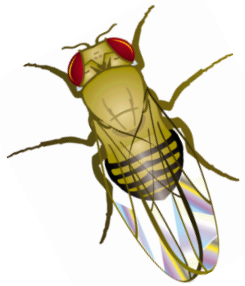
These are vials of flies

Does working deep underground affect lifespan?

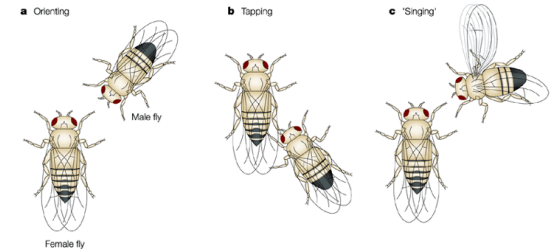
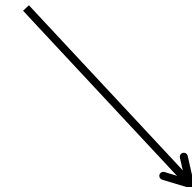
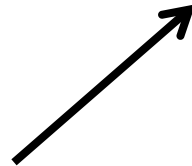
Cognition



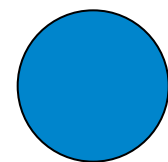
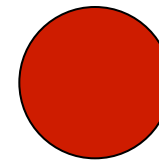
Bumping Uglies



SNOLAB



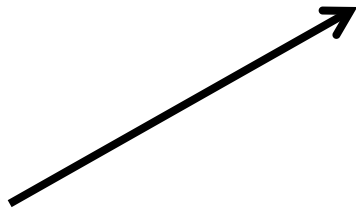
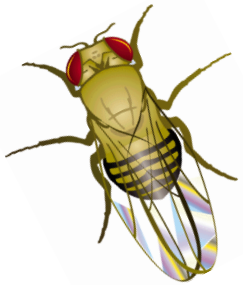
Tinder, but for flies



Daycare

Do we make poor decisions underground?

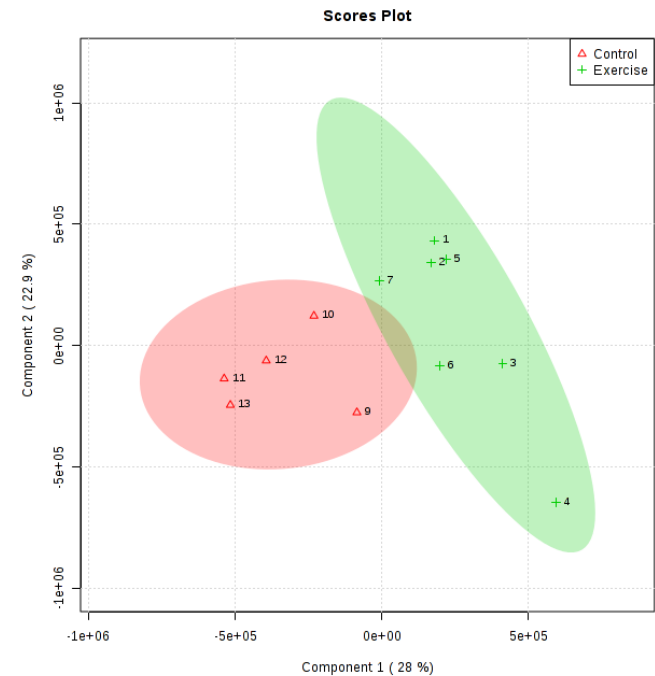
Exercise Metabolomics



The Wheels on the Bus

The Flygometer 2.0

2 hours exercise modifies metabolome

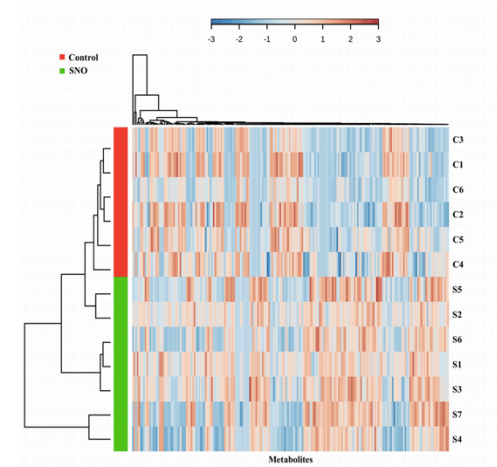
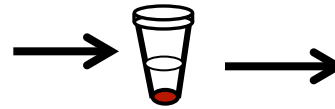


Long-Term Research

Diet studies



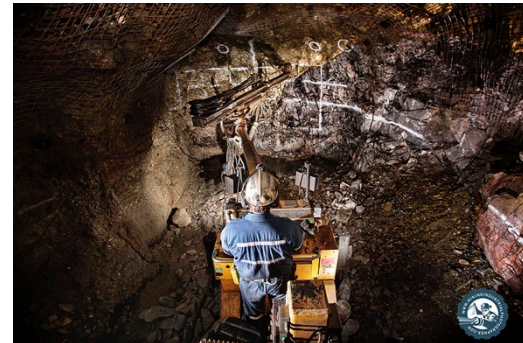
SNOLAB



Genetic engineering

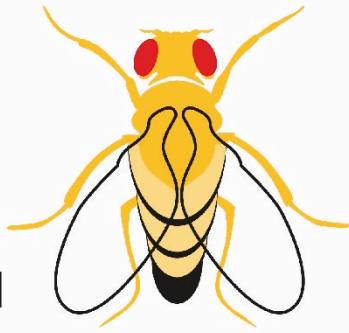
Ultimate goal: reduce the stress

To do this we need to understand the stress

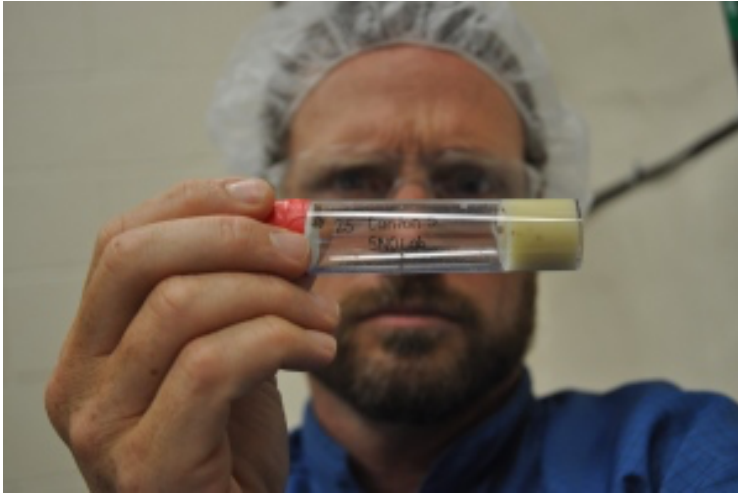


FLY ME

FLIES IN A MINE



Thomas Merritt
@tjasmerritt



LAB SPACES / S1 EP7

Inside the Dark Matter Lab Buried
Over a Mile Underground

Cue the CBC



Art MacDonald
signed Fly Vial

We have a responsibility to explain what we
do and why its important



You, Paul Lefebvre, Laurentian Research and 3 others

Acknowledgements



Canada Foundation for Innovation
Fondation canadienne pour l'innovation



Canada Research
Chairs

Chaires de recherche
du Canada



NSERC
CRSNG



Laurentian University
Université **Laurentienne**

