Genesis 3 verses 12 and 13

12 And the man said: 'The woman whom Thou gavest to be with me, she gave me of the tree, and I did eat.'

13 And HaShem G-d said unto the woman: 'What is this thou hast done?' And the woman said: 'The serpent beguiled me, and I did eat.'

Genesis 47 verses 8 and 9

8 And Pharaoh said unto Jacob: 'How many are the days of the years of thy life?'

9 And Jacob said unto Pharaoh: 'The days of the years of my sojournings are a hundred and thirty years; few and evil have been the days of the years of my life, and they have not attained unto the days of the years of the life of my fathers in the days of their sojournings.'

Exodus 20 verse 5; the second commandment:

5: thou shalt not bow down unto them, nor serve them; for I HaShem thy G-d am a jealous G-d, visiting the iniquity of the fathers upon the children unto the third and fourth generation of them that hate Me;

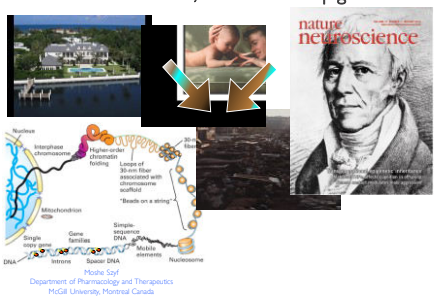
Deuteronomy Chapter 30 verse 19

I call heaven and earth to witness against you this day, that I have set before thee life and death, the blessing and the curse; therefore choose life, that thou mayest live, thou and thy seed;

Avot Chapter 3

MISHNA *R*. "Everything is foreseen and free-will is given. And the world is judged by grace; and every one is judged according to the majority of his deeds" (*i.e.*, if one has done more good than evil, he is judged more favorably--Rashi).

Freedom of Choice, Genetics and Epigenetics



Moshe Szyf
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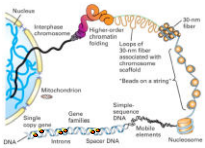
What is genetic predetermination?

- Genes are inherited from our ancestors
- Genes define our "phenotype"
- Differences in our inherited genetics define who we are and the decisions that we make.
- Therefore by learning our genetic differences we will have a clear explanation of who we are, what diseases we will die from and the choices that we make.
- Genes interact with environments who together predetermine our life course.
- Is there any space left for freedom and choice?
- Who has agency?

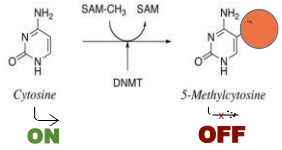
Epigenetics- the genome software

- DNA- Hardware
- Sequence- Operating system
- DNA methylation-Software



- Different "Apps" make cells perform specific tasks in space and time

EPIGENETICS; DNA methylation a binary code for programming DNA



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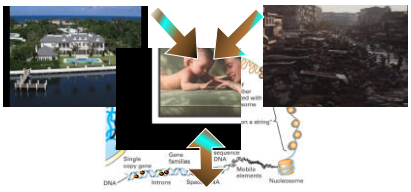
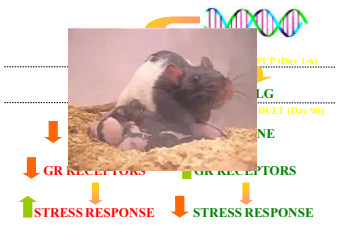
EPIGENETICS: THE SOFTWARE THAT PROGRAMS THE CELLS IN OUR BODY

5

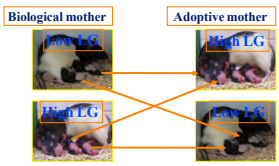
OUR LIFE EXPERIENCES AND EXPOSURES PROGRAM OUR DNA AS WELL and potentially define our life course



Programming by the early "social" environment



Could we reverse epigenetic programming? Is this a first example of freedom from genetic bondage?IDoes this support freedom of choice or parenta and societal l determinism?

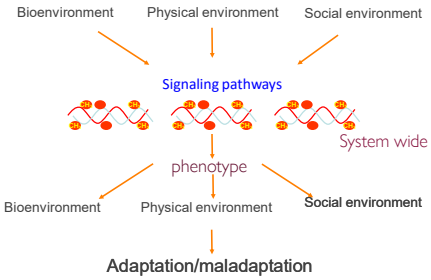


Cross-fostering /adoption experiment

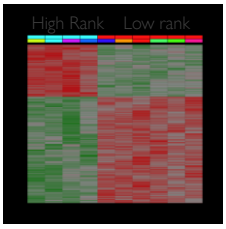
Genome DNA METHYLATION adaptations in response to changing environments

- Evolutionary time scale
- Trans-generational time scale
- Life long time scale
- Life cycle stations time scale
- Seasonal time scale
- Physiological proximal time scale

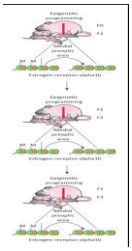
Adaptive response of the epigenome to signals in early life results in an exposure directed change in phenotype



Differential DNA methylation in the placenta associated with social rank differences in mothers in rhesus monkeys

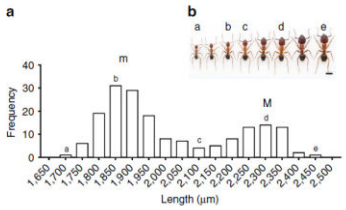


Multigenerational exposures can stabilize phenotypes across generations through epigenetic mechanisms

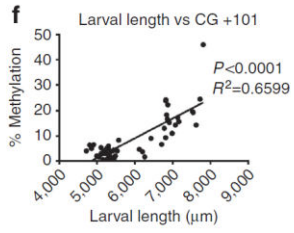


Epigenetic variation in the *Egfr* gene generates quantitative variation in a complex trait in ants

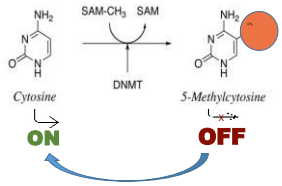
Continuous size distribution of workers in C. floridanus.



Interindividual differences in larval length correlate with interindividual differences in DNA methylation in the EGFR gene



Could we reverse epigenetic programming? Do we have control over our epigenetic heritage?



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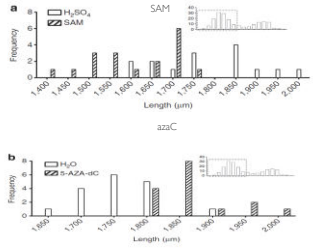
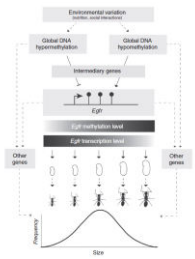
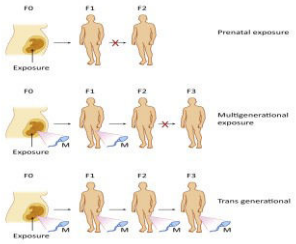
Could epigenetic manipulation alter size distribution in ants? Degrees of freedom?



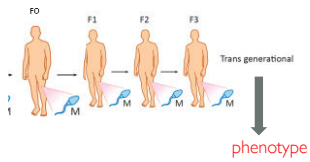
Environmental driven quantitative epigenetic traits



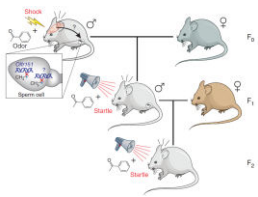
Three modes of transgenerational epigenetic transmission



Can adult experience be transgenerationally transmitted?



Epigenetic inheritance of ancestral odor fear conditioning



(Dias &Ressler)

QUESTIONS AND CHALLENGES

How does experience, particularly social experience perceived by the brain, translate into epigenetic marks in sperm?

How does the DNA methylation mark escape two stages of massive erasure of DNA methylation in sperm during germ cell differentiation and early after fertilization?

How does the methylation mark in sperm translate into a program of differentiation leading to a change in expression in brain?

Do epigenetic mechanisms play a role in evolution of species?

Is it possible that such epigenetic processes drive evolution of species in response to human driven and physical environmental challenges?

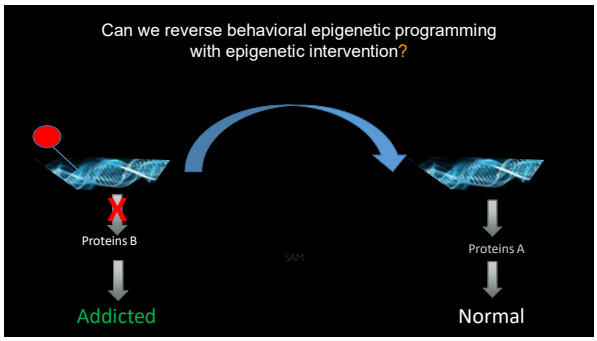
Sciencexpress

Reconstructing the DNA Methylation Maps of the Neandertal and the Denisovan

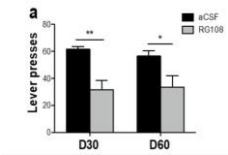
David Gokhman,[1] Eitan Lavi,[1] Kay Prüfer,[2] Mario F. Fraga,[3] José A. Riancho,[4] Janet Kelso,[5] Svante Pääbo,[6] Eran Meshorer,[1]* Liran Carmel[1]*

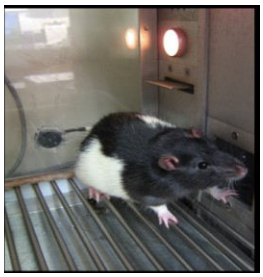
17 April 2014

DNA methylation possibly driving homo sapiens evolution?

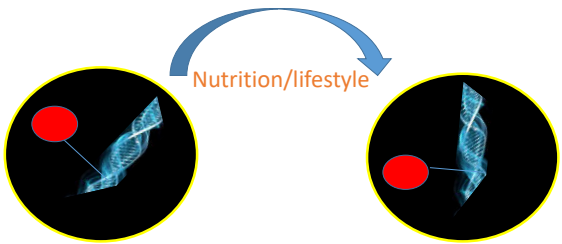


Addiction and loss of freedom of choice; can we reverse addiction?





Can we control our "epiaging clock?



Is there space left for freedom of choice?

- Parental choices and our freedom
  - Parental responsibility
  - Societal responsibility
  - Political responsibility
  - Personal responsibility
- The role of history in restricting and expanding our freedom of choice