

Neuroepigenetică

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*Platon recomandă reproducerea selectivă a oamenilor sănătoși, deștepți și curajoși-
eugenia platoniană.*

Hipocrate consideră că germenii noului individ sunt produși de către întregul organism, atât de părțile sănătoase, cât și de cele bolnave; observă că indivizii sunt deosebiți unul de altul și consideră că medicul trebuie să trateze bolnavul nu boala.

“Eu, Socrate, am învățat această incantație (descântec), acolo, în oaste, de la un medic trac, unul dintre ucenicii lui Zamolxis... Spunea tracul acela că Zamolxis, care este și un zeu, ne învață că după cum nu trebuie să încercăm a trata ochii, fără să ținem seama de cap, nici capul nu poate fi tratat, neținându-se seama de corp, tot astfel trebuie să-i dăm îngrijire trupului dimpreună cu sufletul...”

Platon - Dialogul despre înțelepciune cu Charmides

Socrate 470-399; Platon 427-347; Aristotel 384-322; Hipocrate 460-370 î e n.

Noțiuni generale

Ch. Darwin- Originea Speciilor 1859

Gregory Mandel, 1865

*Walther Flemming, 1879- colorația
cu anilină a cromatinei, mitoza la
salamandră.*

- Walter Sutton, 1902 – teoria cromozomială a eredității

- W. Bateson, 1902- genetică

- Hans Wincler, 1920- genom

C.Waddington, 1939- epigenotype, “The total developmental system consisting of interrelated developmental pathways through which the adult form of the an organism is realized.”

Conrad Waddington, 1942- Epigenetics- to refer to the study of the “causal mechanisms” by which “the genes of the genotype bring about phenotypic effects.”

F. Crik și J. D. Watson, 1953- modelul acizilor nucleici

I started my research career in physiology as a full 'card-carrying' reductionist. I still use its methods quantitatively in my current research on simulating the organs of the body. And that is how, during the last decade or so, I have come to see the need to redress the balance. If we all keep our noses down to the lower-level grinds-tone, no-one will see the bigger picture, or realise what is needed if we are to fill it in.

Denis Noble. The MUSIC of LIFE. Biology beyond the Genome

Successful integration at the systems level must be built on successful reduction, but reduction alone is far from sufficient. Like any polemicist, I make free use of metaphor.

Denis Noble. The MUSIC of LIFE. Biology beyond the Genome

It says that at this stage in our exploration of life, we need to be ready for a basic re-think. Molecular biology requires a certain way of thinking. It is about the naming and behaviour of the parts. We reduce each whole to its component parts and define them exhaustively. Biologists are now perfectly used to that thinking and the interested lay public has caught up, too. So we are now ready to move on. Systems biology is where we are moving to. Only, it requires a quite different mind-set.

We can now pinpoint a gene mutation whose effects may 'kick in' during middle age to cause sudden cardiac death. We know nearly all the major steps in this causal chain, though not yet why it kicks in precisely when it does in a given individual. This kind of success is more and more common. Yet, such examples are not appearing with the frequency that optimists predicted when the human genome project was announced. The benefits for healthcare are slow to arrive.

Denis Noble. The MUSIC of LIFE. Biology beyond the Genome

*The French Nobel Prize-winners Jacques Monod and François Jacob referred to the 'genetic program', the idea that the instructions for the development of each living organism lie in its genes. The same idea is conveyed by the popular description of the genome as the 'book of life', a kind of blueprint. The central role of genes as causal agents was also greatly reinforced by popular perceptions of Richard Dawkins' highly influential book *The selfish gene* (Dawkins 1976).*

” Oriunde există viață trebuie să existe replicatori...întreaga viață evoluează prin supraviețuirea diferențiată a entităților replicante”-replicatori

-replicator incorporat=memă

“Memele se propagă în bazinul de meme sărind din creier în creier prin intermediul unui proces care, în sens larg poate fi numit imitație”

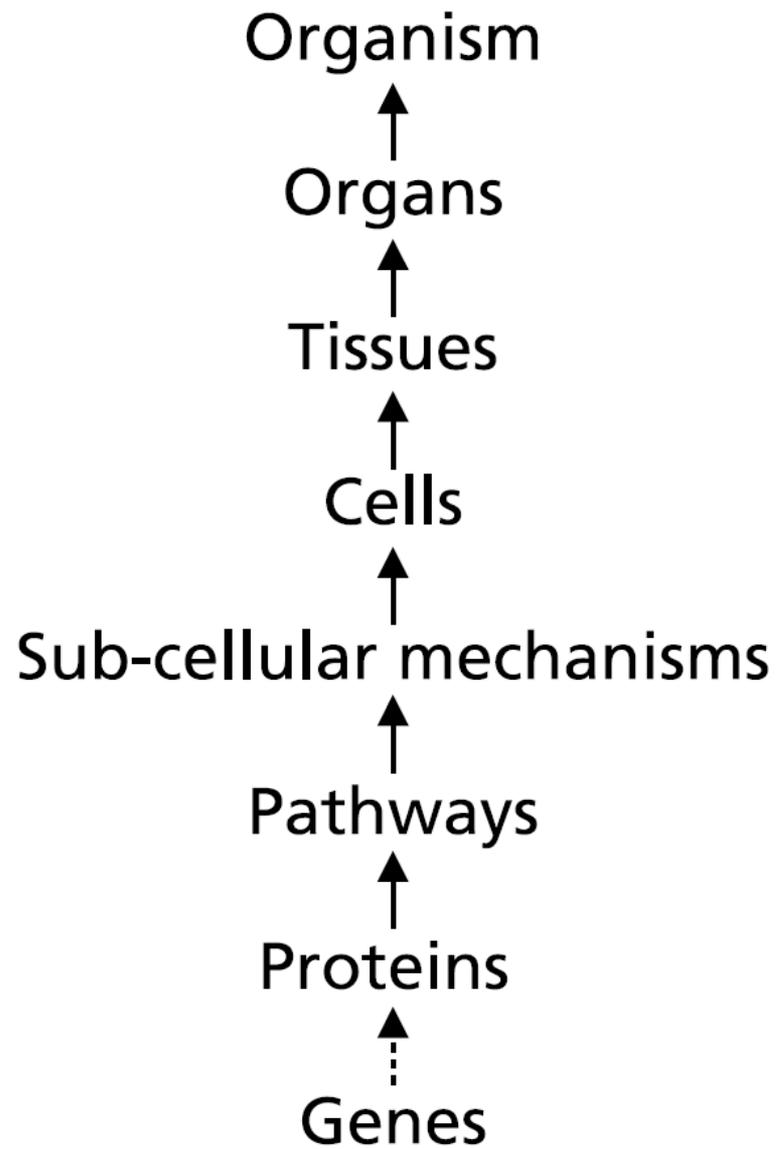
Ele concurează ... pentru resurse limitate: timp de creier sau lărgime de creier. Ele concurează mai ales pentru atenție.

R. Dawkins- Gena Egoistă. Ed. Tehnică.2006

“Cred că un nou tip de replicator a apărut recent pe această “planetă”. Ne privește în față. Este încă în copilărie, încă plutind în derivă, neîndemânatic, în supa sa primordială, însă deja realizează schimbări evoluționare într-un ritm care lasă mult în urmă bătrâna genă.

Acea “supă” este cultura umană; vectorul de transmitere este limbajul; iar spațiul de împerechere este creierul.

R. Dawkins- Gena Egoistă. Ed. Tehnică.2006



The reductionist causal chain.

In fact, the DNA just sits there, and occasionally the cell reads off from it a sequence that it needs, in order to get some protein produced. This looks very much like my hi-fi equipment reading the digital information on a CD to generate the real 'action': the music. So the first step in the reductionist chain of cause and effect is not a simple causal event at all.

Denis Noble. The MUSIC of LIFE. Biology beyond the Genome

The role of epigenetic molecular mechanisms in regulation of CNS function is one of the most exciting areas of contemporary molecular neuroscience. This emerging field, variously referred to be neologisms such as "Behavioral Epigenetics" or "Neuroepigenetics" ...

There is clearly good reason for the excitement associated with studies of epigenetics and mental health. While the inaccessibility of the human brain is indeed a major limitation, it is worth noting that earlier studies of peripheral samples contributed to our understanding of the biochemical basis of psychiatric disease, and revealed the degree to which the underlying biological processes were dynamically regulated by environmental signals.

Thus, perhaps the most important contribution will be the capacity to provide finally the biological basis for the integration of nature and nurture, and reveal the degree to which the study of one enriches our understanding of the other.

*I. D Sweatt. **Epigenetic Regulation in the Nervous System**. Elsevier. 2013*

Nurture- the sume of environmental influences and conditions acting on organism, especially in contrast to heredity. The free Dictionary

Organisms are defined by the information encoded in their genomes, and since the origin of life this information has been encoded using a two-base-pair genetic alphabet (A–T and G–C). In vitro, the alphabet has been expanded to include several nonnatural base pairs

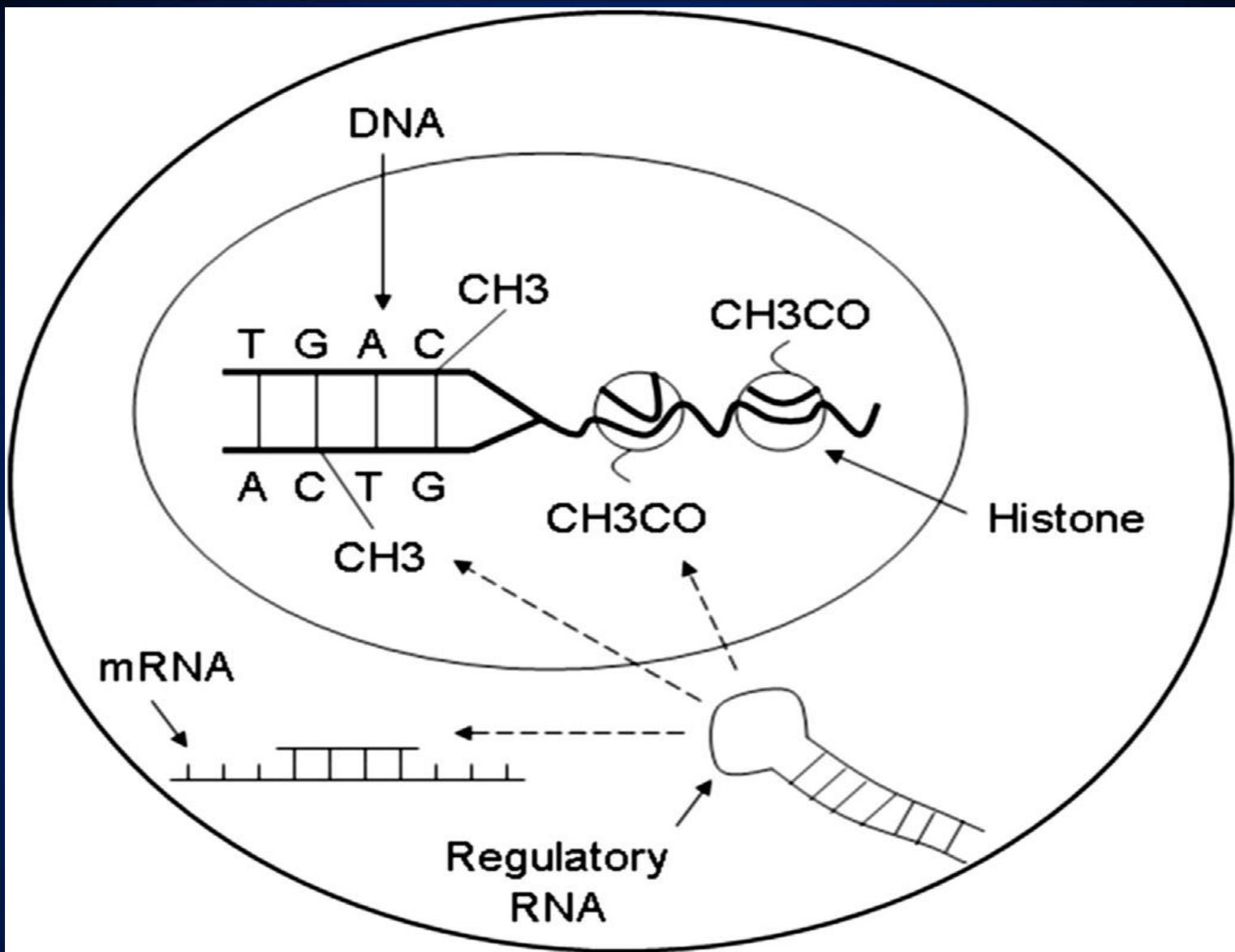
Denis A. Malyshev A.D. A semi-synthetic organism with an expanded genetic alphabet. N A T U R E, 5 0. 2014.

In transgenerational epigenetic inheritance, phenotypic information not encoded in DNA sequence is transmitted across generations. In germline-dependent mode, memory of environmental exposure in parental generation is transmitted through gametes, leading to appearance of phenotypes in the unexposed future generations.

A. Sharma. Transgenerational epigenetic inheritance: Focus on soma to germline information transfer. Progress in Biophysics and Molecular Biology (2013)

The memory is considered to be encoded in epigenetic factors like DNA methylation, histone modifications and regulatory RNAs. Environmental exposure may cause epigenetic modifications in the germline either directly or indirectly through primarily affecting the soma. The latter possibility is most intriguing because it contradicts the established dogma that hereditary information flows only from germline to soma, not in reverse.

A. Sharma. Transgenerational epigenetic inheritance: Focus on soma to germline information transfer. Progress in Biophysics and Molecular Biology (2013)



Epigenetic factors potentially underlying transgenerational inheritance.

...role for EC in providing functional support to subjacent cardiomyocytes by communicating via soluble paracrine mediators. In this study, HG was a common stimulus for HepL secretion from the EC, in addition to promoting its uptake into the cardiomyocyte. The presence of heparanase in the cardiomyocyte dramatically changed the expression of apoptosis-related genes, providing an acute cardio-protective effect.

Wang F et al. High glucose facilitated endothelial heparanase transfer to the cardiomyocyte modifies its cell death signature. Cardiovascular Research (2016)

A sheet of cobblestone-like endothelial cells is transformed to resemble the inner surface of a blood vessel, comprising highly ordered and highly elongated cells. Some aspects of the mechanisms controlling this are known.

Vascular endothelial cells exposed to an EF in culture increase secretion of the angiogenesis producing VEGF). Secretion increases severalfold within 5 min, peaks around 30 min before dropping off, and undergoes a second peak in VEGF release between 4 and 24 h.

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