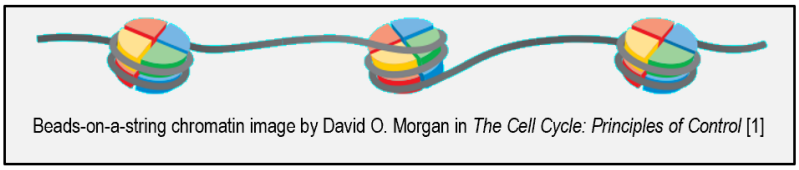
The DNA Chromatin Superradiance Hypothesis

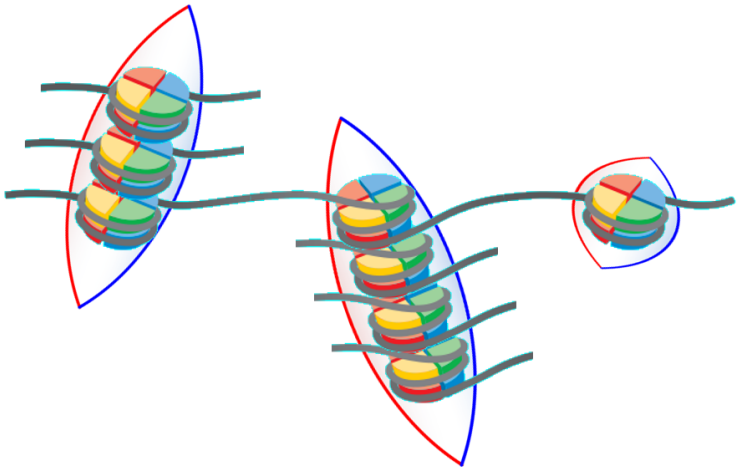
Terry Bollinger
2024-08-19.23:30 EDT Sun



Beads-on-a-string chromatin image by David O. Morgan in *The Cell Cycle: Principles of Control* [1]

Infrared Superradiance Hypothesis

- **Chromatin coiling amplifies the range of shared quantum states**
- **Infrared photon frequencies bridge distances between units**
- **Photon repression gives quasi-crystals, bursts give movement**
- **DNA state patterning gives *molecular* quantum computation**



Hypothesis: Infrared quantum computation may guide the seemingly random motion of nuclear DNA units.

Background: *The infrared superradiance hypothesis began as a comment* [2] *on an Aug. 12, 2024, video discussion* [3] *by Joscha Bach and Michael Levin on ontogenic error correction. This video is on Curt Jaimungal's Theories of Everything (TOE) YouTube channel* [4] *and is an excerpt from a much longer 2022 discussion* [5]*. This paper reproduces the conversation and adds figures that elaborate the concept.*

What a delightful and insightful cross-disciplinary dialog this was! The joint proposal seems to be that certain lineages, with planaria as the prime example, engage in especially high levels of *ontogenic error correction*: Error correction by cells that actively seek out errors during growth and differentiation and then morph and move to correct those errors.

High-correction ontogeny would require multiple levels (scales) of correction to work well since, for example, feet and hands are homologous. They thus would benefit from one broad level of correction, while the paths of fingers and thumbs require a more detailed, context-dependent level of correction. This also argues that ontogeny and ontogenic error correction are different faces of the same coin: Context-dependent differentiation versus varying degrees of correction using the same context clues.

A Possible DNA Role

I would toss in an observation that may sound tangential: Why, despite needing only a tiny fraction of the total DNA of an organism for their particular tasks, do cells retain the complete genome with only extremely rare exceptions?

Error correction requires a template to define what correction means. Perhaps folks need to look at the cellular genome in two distinct ways: Not just as a very detailed recipe source for protein manufacture but also as a broad, more holographic-style (image in the details) map of the relationships needed by a cell in response to each ontogenic context it may encounter.

Intriguingly, if one looks closely at the hypothesis that, in addition to its ribosomal messages, the compact cellular genome encodes a second ontogenic context map that continually informs the cell how to translate various combinations of local chemical and electrical gradients into activation of specific gene sets, the hypothesis becomes predictive.

If it exists, the contextual expression encoding (CEE?) of a compact cellular DNA core would need to be holographic rather than strand-specific since there is no mechanism by which the cell could "unwind" the entire genome to get an interpretation of what to do given certain gradients.

That sounds impossible, except that the 2024 Babcock superradiance paper on a possible neural source of robust quantum entanglement suggests this may not be true [6] [7]. Like microtubules, chromatins tightly and regularly wind DNA into a tightly coiled configuration. In the case of tryptophan, this regularity enables quantum effects to scale to macroscopic scales (Fig. 2).

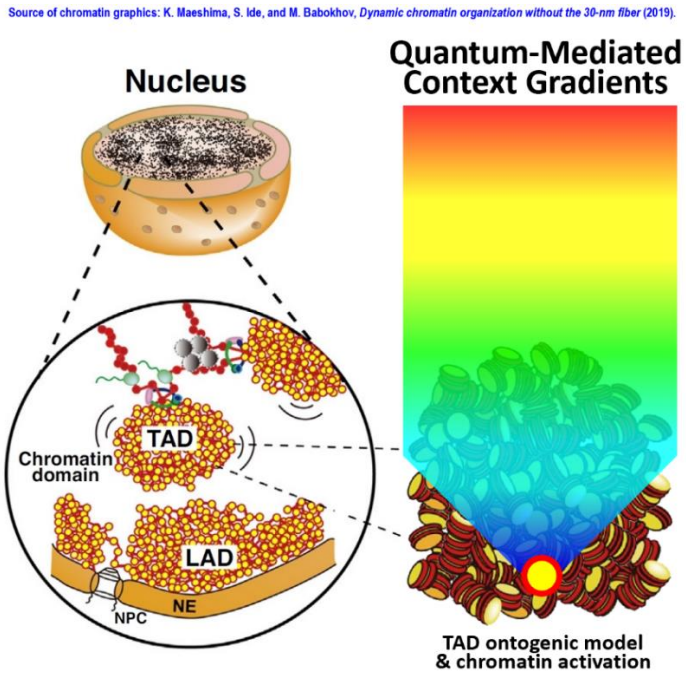


Figure 2. *Initial hypothesis: A mechanism exists in the nuclei of multicellular organisms that translates biological context information into activations of specific combinations of chromatin movements and the formation of short-term (quasicrystal) stacks of chromatins from multiple strands. If valid, this hypothesis requires that the full collection of chromatins encodes a model of the ontology of the organism and that this model resides more in the collective organization and internal structure of the chromatins than in specific DNA sequences. This geometric hypothesis may provide a new approach to assessing the importance and role of non-coding DNA and highly repeated sequences.*

Thus one prediction of the CEE hypothesis is that compact DNA encoding, including potentially the support proteins since this is more a matter of geometry than direct chemical bonding, supports some variant of the superradiance concept. If superradiance does exist in compact DNA cores, the next step would be to look for cases where this superradiance effect triggers the unfolding of specific regions of the compact core. [Addendum: The unfolding effect most likely would be mediated by the formation of stacked or "quasicrystal" chromatin units that selectively expose DNA for activation. Chromatin units on the surface and in the interior of cell nuclei are highly mobile, with rapid transitions between participation in quasi-liquid and quasi-crystalline states [8] (See Fig. 3). If the infrared superradiance hypothesis is correct, transitions between these states would be guided both by infrared activity and broader cell-level electrical and chemical gradients.]

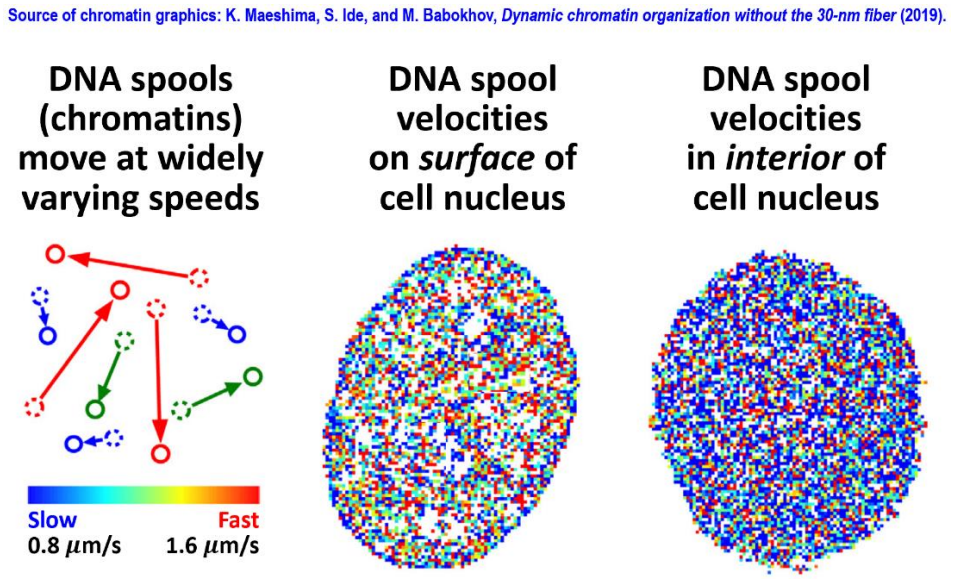


Figure 3. *The chromatin set of a cell nucleus is highly mobile, with individual units alternating between a broad range of velocities and quasi-crystalline states of stacked chromatins. The dynamics behind this motion are not well understood.*

Non-coding DNA, with its majority position, would play a big role in superradiant DNA activation. The very repetition of some areas would be conducive to building larger-scale quantum effects, for example.

It would be interesting if the DNA core uses such quantum relations to behave directly like a hologram. It would be a hologram that responds not to light but to the presence of, say, electrical and chemical gradients, translating them within the confines of the core into specific activation pulses for deciding which regions to activate and unwind.

Another CEE prediction is that the DNA cores of high-correction organisms such as planaria should have an especially strong and sharp encoding of the holographic component of the genome. Even without a method for directly detecting holographic translation, a stronger holographic image in planaria DNA should show up as structural differences from average DNA cores. The most likely difference would be more repetition of non-coding DNA sequences. [Addendum: Another test path would be to look for oddly structured infrared emanations from active nuclei.]

References

[1] D. O. Morgan, *The Cell Cycle: Principles of Control*. New Science Press (NSP) Ltd., 2007. Page 76: https://www.google.com/books/edition/The_Cell_Cycle/_7ygQAOK1DUC?gbpv=1&pg=PA76

[2] T. Bollinger YouTube comment on 2024-08-18.16:30 EDT Sun, https://youtu.be/WG_5AmPK2q4&lc=Ugw1TpvOIcVI5jhDA094AaABAg

[3] J. Bach, M. Levin, and C. Jaimungal, *The Biggest Insight From Joscha Bach and Michael Levin's Work*, TOE (YouTube) **2024**, 0812 [Aug. 12] (2024). https://youtu.be/WG_5AmPK2q4

[4] C. Jaimungal, *Theories Of Everything* (YouTube channel), https://www.youtube.com/@TheoriesofEverything

[5] M. Levin, J. Bach, and C. Jaimungal, *Michael Levin Λ Joscha Bach: Collective Intelligence*, TOE (YouTube) **2022**, 1109 [Nov. 9] (2022). https://youtu.be/kgMFnfB5E_A

[6] N. S. Babcock, G. Montes-Cabrera, K. E. Oberhofer, M. Chergui, G. L. Celardo, and P. Kurian, Ultraviolet *Superradiance from Mega-Networks of Tryptophan in Biological Architectures*, The Journal of Physical Chemistry B **128** (17), 4035-4046 [May 12] (2024). https://pubs.acs.org/doi/epdf/10.1021/acs.jpcb.3c07936

[7] T. Bollinger, *New Results Bolster Penrose's Quantum Consciousness Hypothesis*, Apabistia Notes **2024**, 05131544 (2024). https://sarxiv.org/apa.2024-05-13.1544.pdf

[8] K. Maeshima, S. Ide, and M. Babokhov, *Dynamic chromatin organization without the 30-nm fiber*, Current Opinion in Cell Biology **58**, 95-104 (2019). https://www.sciencedirect.com/science/article/pii/S0955067418301881