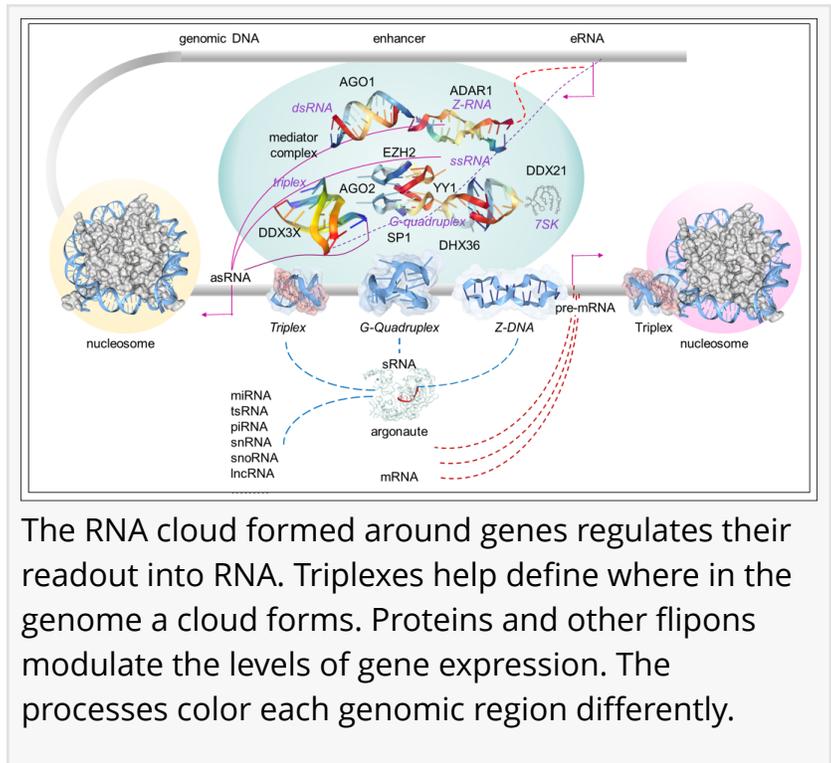


Biological roles for three strand DNA and RNA flipon structures

The cell's version of the multiverse! Here, the focus is on three-stranded DNA and RNA triplex structures. Their biological relevance is now coming into focus.

CHARLESTOWN, MA, UNITED STATES, April 25, 2025 /EINPresswire.com/ -- A paper released on April 14th, 2025, describes the cell's version of the multiverse. The paper, "Triplexes Color the Chromaverse by Modulating Nucleosome Phasing and Anchoring Chromatin Condensates," appears in the [International Journal of Molecular Science](#) and describes the evolving view of how cells decide what information to read from the genome.



As is well known, the genome encodes for many cell types, from skin cells to muscle cells to those that make up the brain. At the same time, it was once thought to be highly prescribed by the precise binding of proteins to DNA. It turns out that the process is much more dynamic. Cells are highly dynamic and rapidly switch programs in response to different stresses. In some cases, this process involves a switch in cell type, a process referred to as phenotypic plasticity.

The paper describes how alternative structures called [flipons](#) set the reading frame to make RNA from DNA. A three-stranded triplex structure creates an open region where DNA is unwrapped. An RNA cloud then forms that connects control elements with particular genes, allowing regulation of their expression by proteins that modulate the cloud. These proteins can interact with DNA to activate gene expression or to suppress readout of genetic information. Other proteins modulate the formation of alternative structures, such as [Z-DNA](#) and G-quadruplexes, that are important in reloading the RNA polymerase enzymes after each transcription cycle.

The term chromaverse cloud is a play on the chromosome name, which was first noticed when

cells were stained with chemical dyes. The chromosome name comes from the Greek word for color. Subsequent work assigned different colors to describe whether a chromosomal region was actively making RNA, closed down, or in a transition state. The various “colors” reflected the protein modifications that produced the different chromosomal structures observed in each region.

This paper captures the expanding role of flipons in gene regulation and identifies the RNA cloud over each as a therapeutic target for reprogramming cells. Several new modalities have recently been developed that allow the specific addressing of each cloud by sequence-specific interactions. Each modality provides delivery of a particular payload to the exact address. The packages can specify where an RNA cloud forms and how rapidly it turns over to vary gene expression like a cell does.

About InsideOutBio: InsideOutBio is a start-up focused on developing a novel class of proprietary therapeutics to 'light' up tumors for the immune system to kill by reprogramming self/nonself pathways within cancer cells. Dr. Herbert leads discovery at InsideOutBio. His work on Z-DNA was foundational to the discovery of flipons. These statements about InsideOutBio comply with Safe-Harbor laws. They are forward-looking and involve known and unknown risks and uncertainties. They are not guarantees of future performance, and undue reliance should not be placed on them.

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