GENOME RESEARCH
Volume 22 Issue 9 September 2012

Commentary

Perspectives

Research

(continued)

Methods

Resources

(continued)

Cover *Genome Research* presents an ENCODE special issue highlighting novel analyses made possible within the production phase of The ENCODE Project. Near the *top center*, a mature mRNA in the cytosol (gray background) comprised of uninterrupted exons (colored blocks) is "attacked" by a (sun-like) ribosome. *Below*, in the nuclear fraction (on blue background at *bottom*), a nascent RNA in which many but not all introns have already been removed is still attached to RNA polymerase II (PolII) (Tilgner et al.). A lariat and a mirtron are close by (Ladewig et al.). Compared to this nuclear RNA, the cytosolic RNA contains a novel donor exon 4 represented by two additional light-blue codons (colored bars), a 3′ UTR exon (circle at black 3′ end), and an RNA editing event in the 3′ UTR (Howald et al.; Park et al.), highlighting the non-identical RNA populations of the nucleus and cytosol. At *bottom*, a DNA helix is bound by multiple transcription factors (TF, entirely red, yellow, or blue), nucleosomes (black with histone modifications), and kidney-shaped RNA-polymerases. (DNA, *left* to *right*) A TF-complex binding DNA upstream of a +1 nucleosome of a gene is surrounded by an asymmetric chromatin organization (differently spaced nucleosomes with different histone modifications) (Kundaje et al.); another +1 nucleosome with a combination of histone modifications is linked to transcription (note yellow-black PolII moving into the gene); cell-type–specific DNA harboring single-nucleotide polymorphisms (SNPs) and/or methylation (red, fluorescing circles) prevent a TF (CTCF here) from binding (Boyle et al.; H. Wang et al.). At the *extreme right* of the DNA molecule, a complex of only two TFs binds upstream of a gene of different function in a DNase-accessible region (Arvey et al.; J. Wang et al.) and this is predictive for expression (Natarajan et al.). At *bottom right*, above ENCODE, a lncRNA (black for noncoding) is represented as shorter than mRNAs, more lowly expressed, retained in the nucleus (Derrien et al.), and untranslated (Bánfai et al.). (Cover illustration in the style of Joan Miró by Luisa Lente at YOYO studio [http://www.yoyo.es/] with biological concepts by Hagen Tilgner. [For details, see above-referenced papers and related work, all in this issue at http://genome.org/content/22/9.toc.])