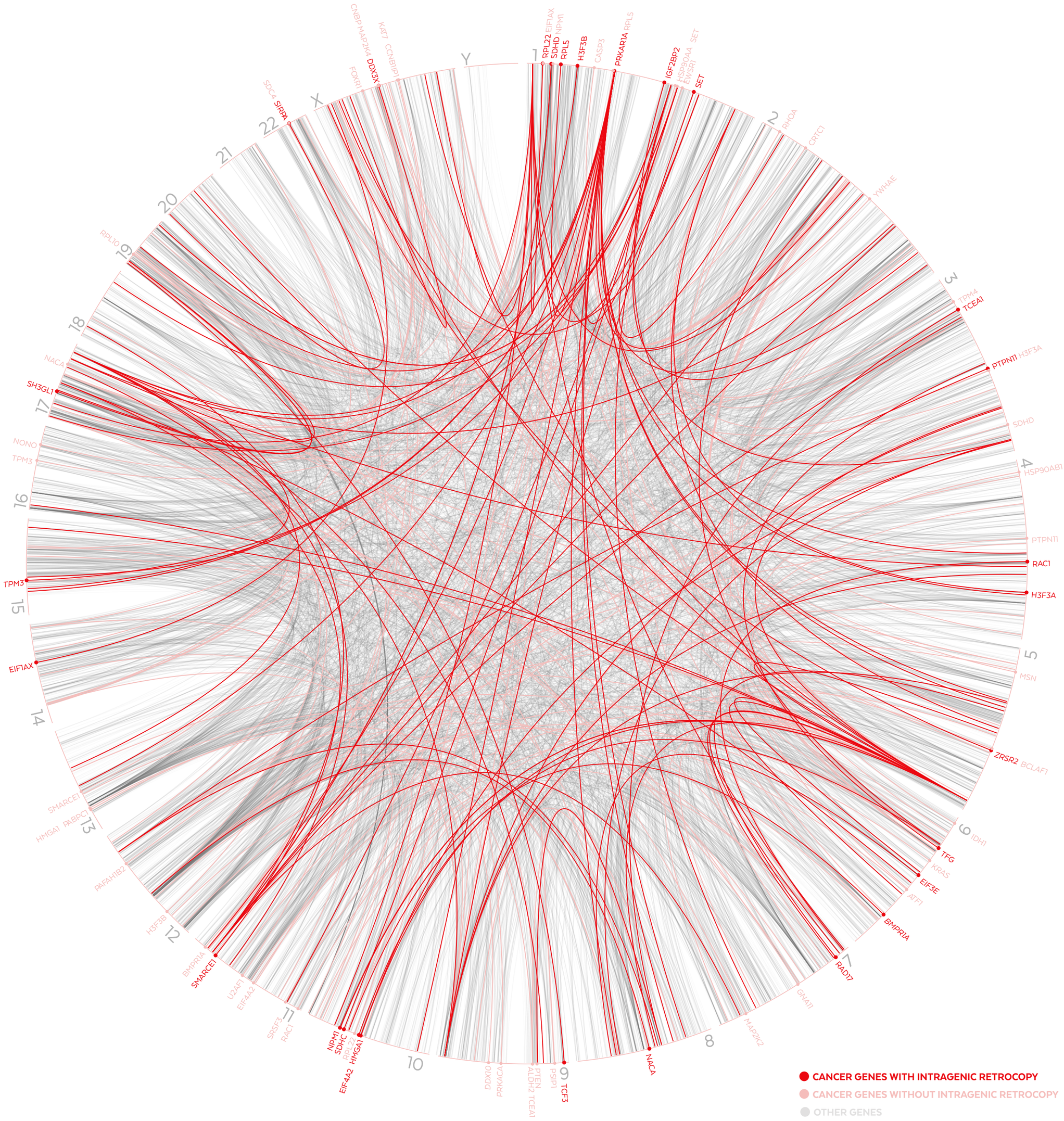
INCREDIBLE GENOME

RETROCOPIES

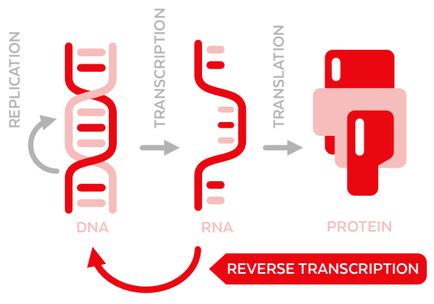
have a nice graph



Retrogenes, *are the new coolgenes*

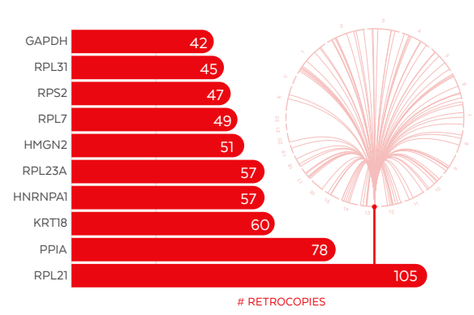
First classified as pseudogenes lacking introns, retrocopies are fascinating genomic elements that defy the central dogma of molecular biology. These elements are genomic copies of a gene (defined as parental gene) but have no introns and have a poliA tract, indicating a RNA-dependent mechanism of gene duplication. Retrocopies are often classified as "dead on arrival" since the lack regulatory elements in the majority of regions where these copies are inserted doesn't favor transcriptional activity. But, when retrocopies are inserted inside a gene (a host gene), they can use its elements to be transcribed! These hard to believe elements are rare to find among Eukaryotes, but in mammals, including us, retropcopies are way more common!

CENTRAL DOGMA OF MOLECULAR BIOLOGY



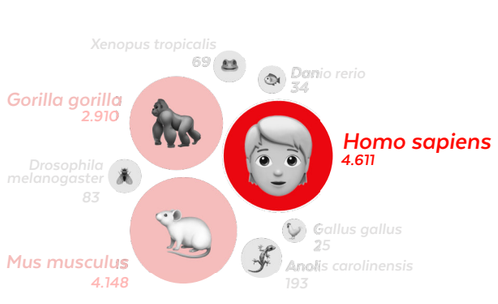
Proposed by Francis Crick in 1958, the central dogma of molecular biology summarizes the flow of genetic information from DNA sequence to protein, often stated as "DNA makes RNA, and RNA makes protein." Since then many other alternative paths were described such as the reverse transcription which originated retrocopies.

TOP 10 MOST RETROCOPIED GENES



The most retrocopied gene in the human genome are the RPL21 with 105 retrocopies. RPLs genes are genes which encode ribosomal proteins and are ubiquity expressed through most human tissues. This expression profile could explain why they are the most retrocopied genes and the importance of these genes could provide a possible evolutional advantage to have many copies.

RETRO SAPIENS?



Mammals, including us, are by far the species with more retrocopies. This interesting aspect are can be most the presence of long interspersed nuclear elements (LINEs) present in mammals, in special LINE1 elements, that provide the needed machinery to the retroposition of processed RNAs with polyA tails.

Rodrigo Barreiro 2021 / version 1.0 / Sources: Retrocopies coordinates and parental genes were obtained from RetrogeneDB2 (http://yeti.amu.edu.pl/retrogenedb/browse.php) and RCPedia (https://www.bioinfo.mochsl.org.br/rcpedia/); For the text, information were retrived from:Kaessmann, H., Vinckenbosch, N. & Long, M. RNA-based gene duplication: mechanistic and evolutionary insights. Nat Rev Genet 10, 19–31 (2009). Casola C, Betrán E. The Genomic Impact of Gene Retrocopies: What Have We Learned from Comparative Genomics, Population Genomics, and Transcriptomic Analyses?. Genome Biol Evol. 2017; Fábio C.P. Navarro, Pedro A.F. Galante, A Genome-Wide Landscape of Retrocopies in Primate Genomes, Genome Biology and Evolution, Volume 7, Issue 8, August 2015