

CELEBRATING A CENTURY OF STUDIES OF GENE BALANCE

James Birchler (University of Missouri, Columbia, USA) and Reiner Veitia (Institut Jacques Monod, Université de Paris, France) have been studying the phenomenon of gene balance for decades. In the January issue of *Cytogenetics and Genome Research* they have published a [review](#)¹ on the occasion of a century of research on gene balance, dosage compensation and the effects of aneuploidy. In the early twenties of the previous century, Albert Blakeslee published his observation in the flowering plant *Datura stramonium* that adding an extra copy of a single chromosome has much more severe effects on the phenotype (i.e. the pigmentation of the flower) than the addition of an entire chromosome set. At the same time Calvin Bridges made similar observations in the fruit fly, *Drosophila melanogaster*, namely that the addition of one autosome was lethal whereas three sets of chromosomes were viable in (triploid) females.

Now, after 100 years of genetic studies, including decades of molecular studies, in these and other model organisms (yeast, maize, *Arabidopsis*, the mouse), it has become clear that both additions and losses of chromosome segments disturb the normal regulatory processes of gene expression that operate all over the genome. One example is that both gains and losses of a gene encoding a single component of a multi-component system affect stoichiometric relationships in such a way that the amount of the complex becomes reduced. The gene balance concept also helps to understand how, during evolution, multiple rounds of whole genome duplication in the vertebrate lineage could have contributed to its evolutionary success.

¹ <https://www.karger.com/Article/FullText/519592>