

A CHROMOSOMAL INVERSION HETEROZYGOSITY THAT HAS LASTED FOR 8 MILLION YEARS

Chromosomes evolve. Translocations, fusions (e.g. human chromosome 2) and, above all, inversions differentiate the chromosomes of even closely-related species. Consider the donkey and the horse: the genes in the two are more or less the same but are arranged differently so that there is a difference in the structure of chromosomes. The two species have no problem with crossbreeding and producing offspring. The problem, however, is that in the germ line of the hybrid offspring (the mule or the hinny) the chromosomes cannot pair leading to the breakdown of meiosis and to sterility. In populations, therefore, heterozygosity of chromosomes is not frequent and often results in the fixation of one of the two forms.

There are however exceptions. The first one was described in *Drosophila pseudoobscura* by Dobzhansky (1944). He reported inversions that persisted in the population of *Drosophila*. It is known that sexual reproduction, **by crossovers, can create favorable combination of gene variants in the same chromosome, but a** meiotic crossover could disrupt the combination. If, however, the chromosomal segment with the two genes is inverted, then the combination persists. This is because if a meiotic crossover disrupting the combination occurs, the resulting recombinant chromosomes which have deletion/duplication are lost. In this way inversion heterozygotes have a selective advantage because the favorable combination of genes is passed on while the embryos with the disrupted combination are lost. This is the most plausible explanation of the very long persistence (~ 8 million years) of a chromosomal inversion present in the heterozygous state in two species of *Cercopithecus* (Old World Monkey). This work has appeared in the latest issue of [Chromosoma](#).