ARTIFICIAL KARYOTYPE MODIFICATION

YAC, Yeast Artificial Chromosomes, (later supplanted by BACs) were popular at the very beginning of the human genome project. While it is relatively easy to manipulate the yeast karyotype, it is much more difficult to perform chromosome engineering in higher eukaryotes. Acrocentric (Robertsonian) fusions are not a rare event in humans, and, very occasionally, homozygous individuals have been reported as a result of consanguineous marriages. In the wild, chromosomal fusions during evolution have led to a reduced chromosome number in several populations, such as mice and other mammals (e.g., sheep and goat with 54 and 60 chromosomes respectively). In *Homo sapiens*, chromosome 2 is the result of a telomere-telomere fusion of two ancestral chromosomes, which correspond to chromosomes 12 and 13 in chimpanzee.

Wang et al. (Science) have used DNA editing technology to create two types of heterozygous and homozygous mice with terminal fusions of chromosomes.

The first type of the fusion is between chromosomes 1 and 2, and the second is between chromosomes 4 and 5. The fusions did not appear to affect chromatin conformation and stem cell differentiation. The developmental trajectory in the two cases, however, was very different. Normal homozygous offspring were possible only in the second case (4/5 fusion).

1- https://www.science.org/doi/10.1126/science.abm1964