

Meeting: 1003, Atlanta, Georgia, Pevzner,

1003-92-16 **Pavel Pevzner***, University of California, San Diego. *Transforming men into mice (or chimpanzees, dogs, chickens, etc.)*.

Genomes are constantly changing. If a genome is compared to a continental land-form, then one type of change - point mutations — is analogous to gradual changes in the landscape due to erosion by wind and water. A second type of change - genome rearrangements — comprises evolutionary “earthquakes” that dramatically change the landscape. These two types of changes are common not only in an evolutionary context but for tumor cells as well.

Earthquakes usually happen around faults, and the question arises whether there exist “evolutionary faults” in human genome. In the last 30 years biologists were answering “no” to this question and followed the Nadeau-Taylor random breakage model of chromosome evolution that rules out the evolutionary faults. I show how the studies of the reversal diameter of the symmetric group and the duality theorem for the reversal distance eventually led to the rebuttal of the random breakage theory. Our results provide evidence against the widely accepted Nadeau-Taylor model and suggest a new “fragile breakage” model that postulates that breakpoints are chosen from relatively short fragile regions that have much higher propensity for rearrangements than the rest of the genome. I further discuss rearrangements in cancer and describe the recent reconstruction of the genomic architecture of the breast cancer cell line.

This is a joint work with Glenn Tesler and Ben Raphael. (Received April 07, 2004)