

541

ORIGIN AND EVOLUTION OF RETROTRANSPOSABLE COMPOUND REPEAT DNA ORGANIZATION (RCRO)

A. Koga, H. Hirai

Primate Research Institute, Kyoto University, Inuyama City, Japan

Presenter's Email: koga@pri.kyoto-u.ac.jp

One significant difference in the structure of chromosomes between humans and chimpanzees is the absence and presence, respectively, of large terminal blocks of constitutive heterochromatin. We have previously shown that these blocks induce or prolong the bouquet stage in meiotic prophase and affect chiasma formation. We infer from these observations that these blocks affect the frequency of gene shuffling in subterminal regions of chromosomes. At least four sorts of repetitive sequences are present in these blocks as constituents: telomeric repeats, subterminal satellite (StSat) repeats, HERV-K, and HERV-W. These sequences, possibly with other elements, appear to form a transposition unit, which we named RCRO. We have examined the distribution and sequence variation of RCRO, focusing on StSat repeats, among 22 species that represented all major taxa of primates. Results we obtained were: (1) Within hominoidea, StSat repeats are present in chimpanzee, bonobo, gorilla and siamang, but not in human, orangutan and other gibbon species examined. (2) Rhesus macaque harbors StSat repeats, but other Old World monkey species examined do not. (3) StSat appears to be absent in New World monkeys and prosimians. (4) The base composition of StSat repeats is similar to one another among chimpanzee, gorilla and rhesus macaque. These results indicate (i) RCROs had already formed large-scale multicopy arrays in the common ancestor of apes and Old World monkeys, and (ii) RCROs have undergone rapid amplification and/or contraction which led to spread to all chromosomes in some species and extinction from genomes in other species.

Keywords: Chromosome, Heterochromatin, Repeat, Transposition