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Chromosomal Evolution and Its Biological Meaning in Primates

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First of all, I introduce aspects of the general phylogenetic evolution of primates, and then I will talk about two subjects which we have recently intensively investigated.

The first subject is the research of genetic differentiation and biogeography in the gibbons. Gibbons are the small apes of the superfamily Hominoidea that live in the canopy of forests of Southeast Asia. They are unique apes that have comparatively higher species diversity, monogamous social structure, vocalization as song for communication, and rapid locomotion by brachiation in the canopy. However, the most characteristic aspect is the high-frequency fixed chromosome translocations, being the highest in mammals. For example, if you compare chromosomes of gibbons and Japanese macaques with human chromosome painting probes, the former has 17 times translocations than the latter. This time, I will introduce chromosomal and biogeographic differentiations in the agile gibbon that inhabits in Indonesia.

The second subject is the research of chromosomal differentiation between humans and the African great apes. The biggest difference between both is the chromosome number, 46 in humans and 48 in great apes. Another additional remarkable difference between African apes and humans is the chromosome terminal heterochromatin. The African apes have large blocks of heterochromatin, but humans have none. Using a molecular chromosomal technique, I found that the heterochromatin consists of at least four different repetitive sequences. Moreover, I identified that a sequence (StSat) of the four arrays are found in the chimpanzee, bonobo, gorilla, shiamang, and rhesus macaque. It is thus estimated that the repetitive arrays of StSat probably emerged at least at the root of the Catarrhini. BLAST analysis showed that the consensus sequence of the StSat repeats was present in the chimpanzee, gorilla, and rhesus macaque. This also allows us to estimate that the sequence originated from a common ancestor of the Catarrhini. Based on these data, I introduce the evolution of the subterminal heterochromatin and its biological meaning.