Chromosome Evolution in Primates

Fig. 1. Comparison of the chromosomes of Homo sapiens (USA; left) and common chimpanzee, Pan troglodytes (PTR; right). The 11 symbols indicate 11 of 12 of the modifications recognized in the cladogram. The 12th modification involves a gain in heterochromatin in many chromosomes of the chimpanzee, not rendered visible by this staining technique (R-banding).

Fig. 2. Hypothetical ancestral karyotype for all living primates (PRI). This karyotype has been reconstructed from chromosomes still existing in several Platyrrhini and Prosimii, and quite closely resembles the reconstructed ancestral karyotype for Carnivora.
Fig. 3. Examples of inversions (inv) observed in human pathology which reconstitute chromosomes found normally in certain other primates: chimpanzee (PTR), gorilla (GGO) and orang-utan (PPY). These inversions thus correspond to either reverse or convergent mutations. For chromosome 5, the 2 inversions similar to PTR5 were induced with radiation.

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- Other
- Robertsonian translation
- Other translocation
- Fission
- Shift
- Complex of unspecified rearrangement
- Modification of heterochromatin
- HSA
- PPV
- GGO

* NCO

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All enopilhecus nigroviridis (ANI) has remained the most primitive in chromosome terms, occupying an intermediate position. Subsequently, a common trunk for all other arboreal species emerged and gave rise to another very complex populational evolution. Following a common trunk for Pongiidae + Hominidae (CAT→PON), the orangutan separated first. Then populational evolution occurred at the end of a common trunk for man (HSA), chimpanzees (PTR and PPA) and gorilla (GGO). The phylogenetic position of gibbons could not be determined on the basis of chromosome data. Overall, there are no major discrepancies between these inferences from chromosome data and consensus views of primate systematics.

N.B.: (1) the relative rarity of true dichotomic evolution, which is frequently replaced by populational evolution when a number of closely related species can be studied, and (2) the strong tendency for accumulation of a given type of chromosome rearrangement in a particular group of species: inversions in Pongidae + Hominidae; fissions and shifts in Cercopithecus, and Robertsonian translocations in Prosimii.

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