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PRIMATE EVOLUTION BY GENE LOSS

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Genome sequencing of several primate species reveals that there are relatively few species-specific genes but relatively many specific pseudogenes. Pseudogenes are defined as genes that have lost function. Nevertheless, the loss of gene function sometimes plays an important role in evolution, depending on environmental conditions. When there are changes in the environment, the significance of a gene, or the functional constraint of a gene will change, potentially leading to the pseudogenization of the gene. For example, in primates, genes of enzymes in the vitamin C biosynthesis have become less functional, and the deterioration of enzymes may have been functionally compensated by a greater intake of vitamin C in the diet of our ancestors. In other words, large amounts of vitamin C in the diet made a deleterious mutation in the gene neutral and allowed it to persist in the population. More than 100 human-specific pseudogenes have been identified, including olfactory receptors, immune-related genes, and metabolic pathway genes, which are related to gathering information from the environment. Due to changes in environmental conditions, such as diet and habitat, pseudogenization becomes neutral or beneficial, rather than deleterious, to individual fitness. In this symposium, examples of these pseudogenes will be presented and the role or significance of the loss of gene function in relation to the evolution of primates will be discussed.

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