

A POPULATION GENETIC TEST OF BALANCING SELECTION FOR COLOR VISION VARIATION IN NEW WORLD MONKEYS

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Color vision is an important characteristic of primates and Neotropical monkeys are highly polymorphic for this trait. Recent field studies have challenged the conventional view that trichromatic color vision is more adaptive than dichromatism. No study has investigated the pattern of genetic variation in the long to middle-wavelength sensitive (L-M or red-green) opsin gene as compared to that of other genomic regions (neutral references) in wild populations of New World monkeys to look for the signature of natural selection. Here we report such a study conducted on spider monkeys (*Ateles geoffroyi*) and capuchin monkeys (*Cebus capucinus*) inhabiting Santa Rosa National Park, Costa Rica. The nucleotide sequence of the L-M opsin gene was more polymorphic than the sequences of the neutral references, although the opsin gene sequences were less divergent between the two species than were the sequences of the neutral references. In a coalescence simulation that took into account the observed nucleotide diversity of the neutral references, the Tajima's *D* value of the L-M opsin gene deviated significantly in a positive direction from the expected range. These results are the first to statistically demonstrate balancing selection acting on the L-M opsin gene. Taking the results of behavioral and genetic studies together, the balancing selection we detected may imply that coexistence of different color vision types in the same population is adaptive.

Keywords: opsin, color vision polymorphism, balancing selection, New World monkeys