December 6, 2018

Dear Dr. Mark Johnston, Editor-in-Chief

On behalf of the authors, I would like to submit the enclosed manuscript entitled “Molecular Evolution of the Meiotic Recombination Pathway in Mammals” for publication in *Genetics*.

The reciprocal exchange of DNA between homologous chromosomes during meiosis – recombination – is a fundamental genomic parameter. Despite the central importance of recombination, basic questions about its evolution have yet to be addressed. While genome-wide association studies are beginning to reveal the genetic basis of differences in recombination rate within species, the genetics of recombination rate variation among species remains poorly understood. One strategy for understanding how species diverge in recombination rate is to inspect patterns of molecular evolution at genes involved in the recombination pathway.

In this manuscript, we examine the molecular evolution of 32 key recombination genes, evenly distributed across each major step in the recombination pathway, in 16 mammalian species spanning primates, murids and laurasiatherians. Our results generate a comprehensive picture of the evolution of the recombination pathway in mammals. We report signatures of rapid and adaptive evolution and, by interpreting our results in the context of the recombination pathway, we are able to nominate candidate genes and steps of the pathway that could underlie species differences in recombination rate.

We look forward to your editorial decision on our article.

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