0.   **Importance of recombination rate**

* The total number of COs per (4n meiotic) cell = genome wide recombination rate (gwRR)
* The gwRR regulates populations responses to selection, and determine the fate of novel mutations.
* This process shapes the genomic patterns of genetic variation.
* It is an integral part for proper chromosome segregation. With an obligate crossover per bivalent may act as the lower bound for gwRR.

**1. Understanding levels of variation in gwRR**

1a. There is substantial in gwRR variation within species (across populations) and (across individuals)

* ~~While there are fewer measures from closely related species, variation at this level is more restricted to finer scales (hotspot level / recombination landscape level).~~

1b. Sex is one of the most notable axes along which individuals vary

* Long history since the discovery.
* Not due to sex chromosomes, but pattern of achiasmy evolution is different case.
* Most species have more recombination in females than males, but there are exceptions.
* Crossover placement is sexually dimorphic: male telomeric, female uniform placement
* SC length / meiotic chromosome length is longer in females of a few mammal species, but there are exceptions, Celegean (not much different) and A.thalnia (opposite direction) (Cahoon and Libdua).

1c. There are still gaps missing from the field

* An understanding of how sex shapes the evolution of recombination cannot be achieved with available data. Comprehensive comparisons of female and male recombination rates usually come from outbred populations (human, dog, cattle, sheep, mouse collaborative cross REFS), in which the role of sex is confounded with the contributions of genetic variation. Although it is clear that the relationship between female and male recombination rates can differ among species, comparisons between and within closely related species are missing.
* Direct contrasts between females and males across a common, diverse set of genomic backgrounds would reveal whether the recombination rate evolves differently in the sexes.

**2.  The House Mouse is a great model for uncovering evolutionary patterns at a short timescale.**

* House mouse complex comes from a recent radiation providing an opportunity to interrogate variation at short evolutionary scales.
* Wild derived inbred strains generate the best comparison of females and males, besides the sex chromosomes, the mouse for each genome is highly similar.
* Unlike some house mouse strains, all strains have the same karyotypes, 20 pairs of acrocentric chromosomes.
* Classical lab strains of mice have generated a mountain of knowledge regarding the genetics and molecular pathway of meiosis.
* House mouse is suited for single cell cytology approaches.

**3. What we accomplished in this paper**

* We report a rare, direct, evolutionary comparison of recombination rate in females and males (or something like this).
* We quantify gwRR of both sexes, from 3 subspecies and outgroups.
* We use rare strains with a recent origin from multiple geographic locations of the species territory.
* We quantified meiotic chromosome morphology (SC length) and placement of crossovers to comprise an approximate picture of the recombination landscape.
* Our results indicate rapid male specific evolution of gwRR.