



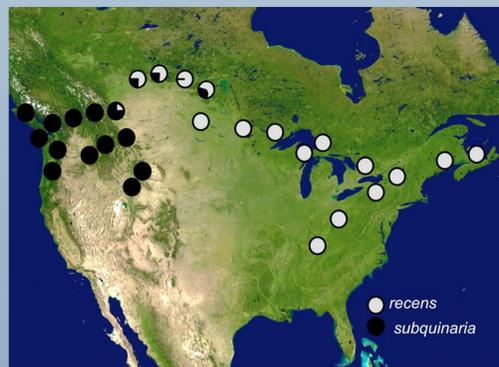
Is The Transmission Rate of Wolbachia Lower in Hybrids Compared to Pure Species?



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Population Biology of Infectious Diseases

Introduction

Wolbachia is a parasite that lives in 70% of all insects. It is passed down vertically, so the mother is able to transmit the wolbachia to all of her offspring through her eggs. It takes over the female's reproductive tissues, causing male-killing, cytoplasmic incompatibility, feminization, and parthenogenesis.



Map of North America depicting the species ranges for *D. recens* and *D. subquinaria*.

Wolbachia occurs naturally in *D. recens*, but not in *D. subquinaria*. In the wild, *D. recens* and *D. subquinaria* hybridize and about 2-3% of those hybrid offspring contain a *D. recens*'s mitochondria, but not the *wolbachia*. This is a strange situation because the mitochondria are only passed down through the mother's eggs. So how is it possible to have a *D. recens*'s mitochondria, but not the *wolbachia* as well?



D. recens
female



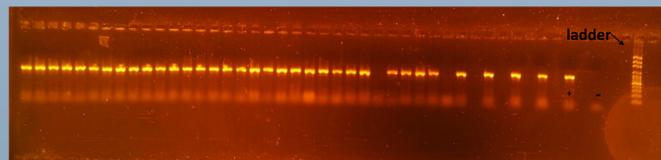
D. subquinaria
male

Methods & Results



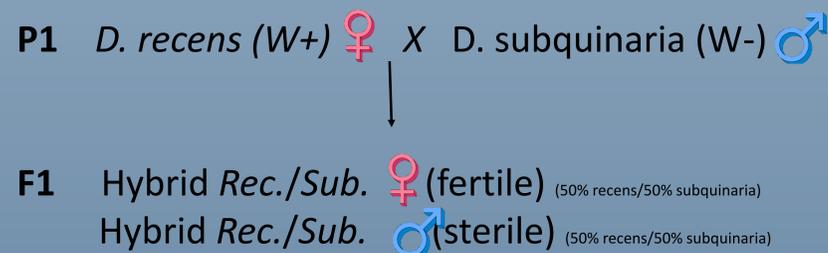
General Methods

- Female virgin flies of *D. recens* were collected and crossed with *D. subquinaria* males.
 - 10 *D. recens* females and 10 *D. subquinaria* males were placed in each vial.
 - There was a total of 10 vials of this cross.
- F1 females were then backcrossed to a *D. subquinaria* male.
 - There was 1 F1 female and 5 *D. subquinaria* males in each vial.
 - 6 F1 females from each line was used, making a total of 36 vials for this cross.
- 24 males and 18 females of each line from the F1 generation were tested for the *wolbachia* parasite using PCR. 12 males and 12 females of each line from the F2 generation were tested for the *wolbachia* parasite using PCR.



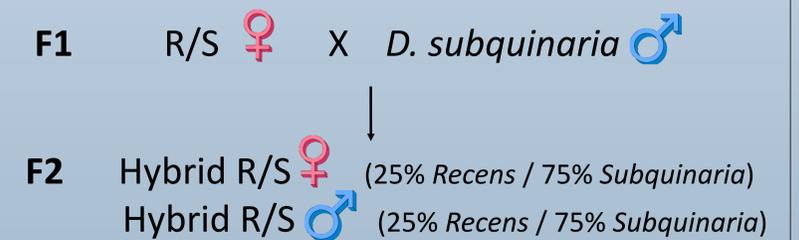
PCR of the *wsp* gene (*wolbachia* gene).

Is *Wolbachia* Transmitted to Hybrids?



- All of the offspring from generation F1 tested positive for the *wolbachia* parasite (n = ##)
- The transmission rate of *wolbachia* for the parental generation to the F1 generation was 100%

Do Hybrids Transmit *Wolbachia* to its' offspring?



F2 Generation *Wolbachia* Transmission Rate

Line #	Transmission Rate
1-24	100%
25	74%
26	30%
27	80%

The average transmission rate for the F2 generation was 95.7%

Conclusion

I observed that the *wolbachia* parasite was 100% transmitted to the first generation of hybrids and 95.7% transmitted to the second generation. One possible explanation is that the *wolbachia* parasite could have been randomly lost during oogenesis. *Wolbachia* must go through a bottleneck process during oogenesis, making it possible to not make it into some eggs. Another possible explanation is that *D. subquinaria* does not possess the *wolbachia* parasite naturally, and since with each new generation the hybrids are becoming more like *D. subquinaria*, they must now possess that same genetic variation that keeps pure *D. subquinaria* from becoming hosts of the *wolbachia* parasite. In the future, I would like to see if the F3 and F4 generations would have a lower transmission rate of *wolbachia*.