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Title: Genetic Basis of Improvement in the Immune Response in Populations of *Drosophila melanogaster* Selected Against a Gram-negative Bacterium *Pseudomonas entomophila*

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Abstract: We investigated the genetic basis of improvement in the immune response in populations of *Drosophila melanogaster* selected against systemic infection by a gram-negative bacterium, *Pseudomonas entomophila* using two separate experiments. Firstly, we tested whether the improvement in immune response in the selected populations, which had happened in a sex-specific manner, had occurred as a result of selection acting on X-linked immunity related loci. To that end, we set up crosses (two parental crosses and two reciprocal hybrid crosses) involving selected populations and their respective controls and measured the immune response of the F1 offspring in terms of survivorship post infection. We did not detect any effect of X chromosome on the immune response, as males from the two reciprocal hybrid crosses had indistinguishable immune responses. The nature of genetic variation underlying the improvement in immune response in selected populations appeared to be largely additive in both sexes, but with a slight trend in the direction of being recessive in males. Secondly, we performed an experiment to test whether adaptive evolution is repeatable over short time scales. We set up crosses between replicate selected populations and measured the immune response of the F1 offspring in terms of survivorship post infection. Our results hint that improvement in the immune response might have involved different genetic changes in replicate selected populations.


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