

Out of the laboratory and into the field: genetically-modified vectors and control of mosquito-borne diseases

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The development of molecular genetic tools for studying arthropod vectors is propelled in large part by expectations that such efforts will result in novel and effective disease-control methods. Studies of vector-pathogen interactions, species and population structure of vectors, and basic biological characteristics such as hematophagy, reproduction and olfaction, have produced results encouraging to these expectations while at the same time revealing some of the daunting complexities of the transmission of the diseases. We are developing mosquitoes that are genetically-engineered to be resistant to pathogens for use in a population-replacement strategy. Laboratory experiments have demonstrated the proof-of-principal that it is possible to insert a gene into a mosquito that normally would be competent to transmit a pathogen, and as a consequence of expression of that gene, the mosquito is now incompetent for transmission. While much remains to be done in improving the refractory genes, the challenges of developing the technology for transferring the laboratory successes to the field now are being taken up. A detailed plan for testing these control strategies must include addressing genetic, epidemiological, ecological and social issues. An integrated, research plan for taking genetic control methods to cage trials in the field will be presented and discussed.