

# Genetically Engineered Mosquitoes for Pathogen Control

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**M**OSQUITO-BORNE DISEASES have been documented as a chronic scourge of human health since written histories have existed, and yet even the best current technologies are unable to eliminate recurring endemic transmission, such as malaria, or occasional surprising epidemics, including Zika. In response, researchers are continually searching for novel solutions to these old problems. The effective, safe, and ethical use of newly developed interventions in tandem with existing interventions, in a societal environment of increasing scrutiny, requires careful review of what may have been unquestioned and accepted practices for an earlier generation.

This special edition of *Vector-Borne and Zoonotic Diseases* focuses on recommendations for moving vector control technologies forward, while ensuring good practice is followed. Most of the articles relate to the development of transgenic mosquitoes for managing targeted vector mosquito populations—a technology that offers a significant potential effect in public health, but which has had limited use so far in countries that might most benefit from it.

Articles led by the researchers at the Centre for Environmental Policy of Imperial College London offer organizing principles for the decision point of when containment facilities, including research teams, are sufficiently ready to accept transgenic strains of mosquitoes, especially considering activities in disease endemic countries. Other articles summarize the experiences of an international research consortium for preparation of insectaries for studies with transgenic mosquitoes and, if appropriate, the transition between stages of study toward eventual use in control of wild populations. These articles address the fine-grain considerations that must be dealt with before insectaries can safely contain transgenic mosquitoes and produce valid study results that form the

basis of recommendations for candidate strains best suited for possible release.

The other two articles, led by M.Q. Benedict, span practices from the old and familiar to the highly novel and as yet untested. The old—mark-release-recapture of mosquitoes, and most often females—has been conducted hundreds of times for decades with, as far as we are aware, no evidence of harm. However, to those unfamiliar with the idea, releasing vector mosquitoes can appear hazardous, an issue addressed in the article. For the new, one article discusses laboratory containment of insects containing “driving transgenes” using examples of mosquitoes. This article considers good practice for managing insects containing “driving transgenes” in insectaries. Issues around which some call gene drive are still being hammered out in various fora, and we hope that this contribution adds a useful perspective to the discussions.

It is our conviction that it is the responsibility, first, of the vector biology research community to propose recommendations to meet the requirements that promote and merit confidence in the efforts that are necessary for implementation of novel solutions. We hope that you find the articles in this special edition a useful resource for guiding research programs and decisions about responsible decisions moving novel interventions to deployment.

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