

Editorial

We Should be Optimistic about Mosquito-Borne Diseases Control

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Mosquito-borne diseases are those spread by the bite of an infected mosquito, and they include Zika, West Nile fever, Chikungunya, dengue, yellow fever, malaria, etc. Nearly 700 million people worldwide get a mosquito-borne illness each year resulting in over 1 million deaths.¹ Vaccination is proved cost-effective in decreasing the burden of diseases. Candidate vaccines against dengue, Chikungunya and West Nile fever are being discussed, and malaria vaccine, RTS,S, was approved as of 2015 with further studies being expected in Africa in 2018.² Moreover, a continued research and development of new vaccines are underway for controlling these mosquito-borne diseases.

Alternative efforts have been focused on the control of mosquito populations. The traditionally widely used approaches include larval control by eliminating mosquito breeding sites, and adult control by mosquito traps and/or spraying residual insecticides. However, the practice of breeding sites elimination is difficult to manipulate/perform; the use of insecticides is not ecologically friendly which can harm bees and other insects; and mosquito traps do not work well and they attract other insects as well. On the other hand, the trap might not work in some unfavorable conditions.

Recently, Oxitec, a British innovative insect control company, has developed genetically modified mosquitoes to assist in mosquito control.³⁻⁵ The working mechanisms are stated as “Oxitec uses advanced genetics to insert a self-limiting gene into its mosquitoes. The gene is passed on to the insect’s offspring, so when male Oxitec engineered mosquitoes are released into the wild and mate with wild females, their offspring inherit the self-limiting trait. The resulting offspring will die before reaching adulthood, and the local mosquito population will decline”.^{3,5} First field trials were performed on Grand Cayman, The Caribbean, and in Brazil, Malaysia and Panama, starting in 2009 and 2011, respectively.⁶⁻⁸ In 2016 the field trials of transgenic male *Aedes aegypti* mos-

quitoes were encouraged by World Health Organization (WHO) to halt the epidemic of Zika virus.⁹

Three new ways of killing mosquitoes were presented by Bart Knols, a Dutch entomologist, during the 2012 TEDx Talk in The Netherlands, and they are “simulating human odor to lure mosquitoes into traps; teaching dogs to recognize the smell of mosquito larvae, so they can sniff out breeding sites; and flood human blood with a drug that kills mosquitoes when they bite”.¹⁰ The good news is that the drug has already been approved for use in animals (i.e., mammals just like us humans). We have a good example of use of veterinary drugs in human medicine with the control of river blindness (in West Africa).

The prospect of potential methods against mosquito-vectored human diseases is increasingly emerging as a reality. Corresponding policies have to be adopted in line with the use and deployment of mosquito-control methods, concerning the possible incurred biosafety and social, cultural and ethical changes.

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