Letter from the Guest Editor

Open Releases of Modified and Living Modified Mosquitoes

Recently there has been a substantial increase in research related to the interaction of Wolbachia and its host and impacts on parasite transmission. This observation by Brelsfoard and Dobson (2011) is very accurate because it has taken just a couple of years for their earlier review paper (Brelsfoard and Dobson, 2009) to become outdated. A landmark step in this context is the recent release of Wolbachia-infected mosquitoes in a natural population Down Under, with the ultimate goal of aiding in the control of mosquito-transmitted diseases such as dengue fever and chikungunya. This is a truly marvellous achievement by the scientists concerned (McMeniman and O’Neil, 2010; Hoffmann et al., 2011; Walker et al., 2011). While applauding them, I also reiterate the urgent need for improving their risk assessment by considering the risk of the strain spreading beyond the proposed release sites, and by making clearer distinctions between different Wolbachia strains under considera¬tion, between different phenotypes they induce in different insects, and between limited-time trial versus limited-time release intending to result in a permanent establishment (Vasan, 2010). This will ensure that promising technologies such as this one do not face any criticisms from independent commentators or from groups who are opposed to releases of modified and/or living modified mosquitoes (LMMs) as a matter of principle (Curtis and Reuben, 2007; Benedict, 2011; Ensink, 2011; Subbaraman, 2011; Gilbert, 2011; Marshall, 2011).

In the meantime, two parallel developments have taken place, both of which are worth mentioning. The first development pertains to open releases of LMMs in Cayman Islands in 2009-2010, Malaysia in 2010, and Brazil in 2011. The release by Harris et al. (2011) is thus far the biggest (~3.3 million sterile male LMMs), and has taken place in Cayman Islands which is not a signatory to the Cartagena Protocol on Biosafety. There is, however, no suggestion that the releases was unsafe or contravened any law because permits were issued after the relevant national authorities performed risk assessments in line with the Island’s draft rules (Gilbert, 2011). As science advances in leaps and bounds, guidance and regulations are trying to keep up. So the second development pertains to advancements in national biosafety frameworks, as well as regional and international activities, including ethical–social–cultural (ESC) dimensions. Worth watching in this category are the ‘MosqGuide’ project, and the Ad Hoc Technical Expert Group (AHTEG) that has concluded their initiative to gather information on risk assessment and risk management of LMMs in accordance with Annex III of the Cartagena Protocol. Beech et al. (2011) have summarised these developments in an update to their earlier short note (Beech et al., 2009a). In 2010, the Cartagena Protocol has also been strengthened by the adoption of a new international treaty called the ‘Nagoya–Kuala Lumpur Supplementary Protocol on Liability and Redress’.

But not everyone is convinced. Besides those who are dogmatically opposed to the idea, there are independent commentators such as Marshall (2011) who feel that the Cartagena Protocol has weaknesses that should be addressed prior to an open release of mosquitoes engineered with invasive gene drive systems, and that several countries are not signatories to the Protocol and may not feel obliged to abide by terms they did not agree to. This highlights the importance of assessing and managing the risk of the strain spreading beyond the proposed release sites that I was alluding to earlier. While continuing to emphasise the risks, we must not lose sight of the benefits that these fascinating technologies can offer. Morris (2011a) has shown how to conduct a structured risk-benefit analysis (for a release similar to Harris et al., 2011), by building on Beech et al. (2009b), Patil et al. (2010) and Morris (2011b). Her conclusions that the benefits outweigh the risks in all categories will resonate with Gubler (2011), who has given a succinct summary of the lessons learned from past successes and failures in prevention and control of Aedes aegypti-borne diseases. While being optimistic about Wolbachia and LMMs, he urges us to see these exciting developments in the larger context of integrated vector management, vaccines and treatments. As he reminds us, new insecticides, new biological control methods (including copepods, Bti, other forms of transgenic mosquitoes (e.g. killer rescue-under dominance), and progress towards safe and effective tetravalent vaccines, antiviral drugs and therapeutic antibodies will all be as critical as modified and living modified mosquitoes in mankind’s war against chikungunya, dengue and yellow fever.

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REFERENCES


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