COMMENTARY

How to handle gene drives in arthropods?

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Gene drives are designed with the inherent property that they should, under the right conditions, be able to rapidly invade and modify a target population in some beneficial way. This aspect of their potential power is appealing on the one hand, yet on the other hand poses several challenges relating to the containment of the gene drive during a research phase that, in order to better understand the impact of the gene drive on wild populations, demands a full and thorough evaluation of its performance and efficacy from lab scale to large cages.

In such a fledgling and growing field, with both active researchers and those with a future interest being distributed around the world in a range of different institutions, now is the crucial time to leverage the existing expertise and wisdom in order to develop an agreed set of principles for researching and developing gene drives for the purposes of arthropod control, and ensuring that their development is carried out in a safe and controlled fashion. In this issue Adelman et al. [1] make an important contribution to the field by describing, as a starting point, a tentative agenda of what should be discussed by the community as best practices are established.

The article makes the important point that gene drives can take many different forms, and can have a different mechanistic 'motor' at their core – those that have garnered most attention recently are those with DNA cutting enzymes at their core, such as CRISPR-Cas9, but there are others that do not rely on DNA cutting and many of these have very different invasion dynamics. For this reason the authors take a pragmatic, performance-based approach to the design and re-evaluation of standard operating procedures for housing and testing gene drives in a secure and controlled setting. The recommendations build on previous guidelines for the housing of 'special case' arthropods such as transgenic

individuals or those infected with disease agents [2]. Suggestions on how to augment these to deal with the case have recently been made [3] and there are existing safeguards commonly adopted for the initial exploratory phase of gene drive development in the laboratory [4]. However, the additional distinction proposed by Adelman et al. [1] is to consider a scenario of a functioning drive for population control, and how to develop and implement standard operating procedures to safely evaluate this experimentally.

The details within the article are likely to be a valuable resource for professionals in institutions and organisations in implementing containment procedures for the safe and efficient evaluation of gene drives for arthropod control.

References

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