Novel Mosquito Control: Variable-Frequency Sound Sweep to Disrupt Aedes aegypti Mating

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Current mosquito control methods, including chemical approaches and genetically-engineered solutions are impractical in some cases as a form of vector control. In many emergent global regions, citizens cannot use large-scale mosquito control and here in the US, many mosquito species, including Aedes aegypti and Anopheles gambiae grow resistant to DEET. As a replacement, a variable frequency sound sweep was utilized as a means to disrupt mating of Aedes aegypti, the species used in this particular test group. A device was built for 19.98 USD using only an Arduino, an 8O speaker (up to ~60 dB), and misc. parts. The device was programmed with C code to play a square wave that oscillated from a start to end frequency. For evaluations, there were 4 Aedes aegypti cages: Cage 1 & 2 held 100 males each, Cage 3 held 100 females, and Cage 4 held ~200 Aedes aegypti of mixed sex. Cage 1 determined the ideal frequency for disrupting males. During trials, correlations between sweep time, frequency range, and respective effectiveness was determined. Observations included that male species attacked the cage side where the speaker was located in an effort to find the “female”. In some cases, the male mosquito believed another male to be a female and attempted to mate. In C2, the ideal frequency sweep was perfected and found to be 350-500 Hz with a 25 second up-down sweep time. In C4, the mixed population, the ideal frequency was tested and showed favorable results, with already mated males being attracted to the speaker at ~80% efficiency and moving away from the remaining females. The concept has shown to be successful and can be deployed in an actual apparatus, where the male population would be attracted into a container emitting a frequency sweep, thus reducing mosquito populations.

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