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Mosquitoes meet microfluidics: High-throughput microfluidic tools for insect-parasite ecology in field conditions[1] MANU PRAKASH, HARIPRIYA MUKUNDARAJAN, Stanford University — A simple bite from an insect is the transmission mechanism for many deadly diseases worldwide — including malaria, yellow fever, west nile and dengue. Very little is known about how populations of numerous insect species and disease-causing parasites interact in their natural habitats due to a lack of measurement techniques. At present, vector surveillance techniques involve manual capture by using humans as live bait, which is hard to justify on ethical grounds. Individual mosquitoes are manually dissected to isolate salivary glands to detect sporozites. With typical vector infection rates being very low even in endemic areas, it is almost impossible to get an accurate picture of disease distribution, in both space and time. Here we present novel high-throughput microfluidic tools for vector surveillance, specifically mosquitoes. A two-dimensional high density array with baits provide an integrated platform for multiplex PCR for detection of both vector and parasite species. Combining techniques from engineering and field ecology, methods and tools developed here will enable high-throughput measurement of infection rates for a number of diseases in mosquito populations in field conditions.

[1]Pew Foundation

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