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Blocking the transmission of vector borne diseases with fungal metabolites

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Mosquitoes transmitted many diseases including Zika and Malaria. Malaria alone is responsible for about two hundred million clinical cases worldwide and kills nearly one million a year. Malaria is caused by *Plasmodium* parasites and transmitted by *Anopheles* mosquitoes. Zika can trigger paralysis and birth defects. Inhibiting pathogen development in mosquitoes will block disease transmission. My research aims to find target genes that are essential for pathogen transmission in mosquitoes, and further to develop drugs targeting these critical genes to stop disease transmission. By genomic approaches, several critical genes have been discovered for *Plasmodium* parasite transmission to *Anopheles* mosquitoes. Furthermore, we tested the hypothesis that small molecule compounds disrupting the interaction would prevent parasites from infecting mosquitoes. We screened a large fungal extract library from more than 12,000 different fungal species, and found several bioactive compounds including *P*-orlandin that specifically inhibits the interaction between FREP1 and *P. falciparum*. Notably, feeding mosquitoes with candidate fungal metabolites significantly inhibited *P. falciparum* transmission to mosquitoes. Surprisingly, spraying one non-toxic candidate compound could prevent mosquitoes from transmitting malaria. Therefore, targeting molecules that are responsible for pathogen invasion with bioactive compounds is an effective novel approach to block the spread of vector-borne diseases.

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