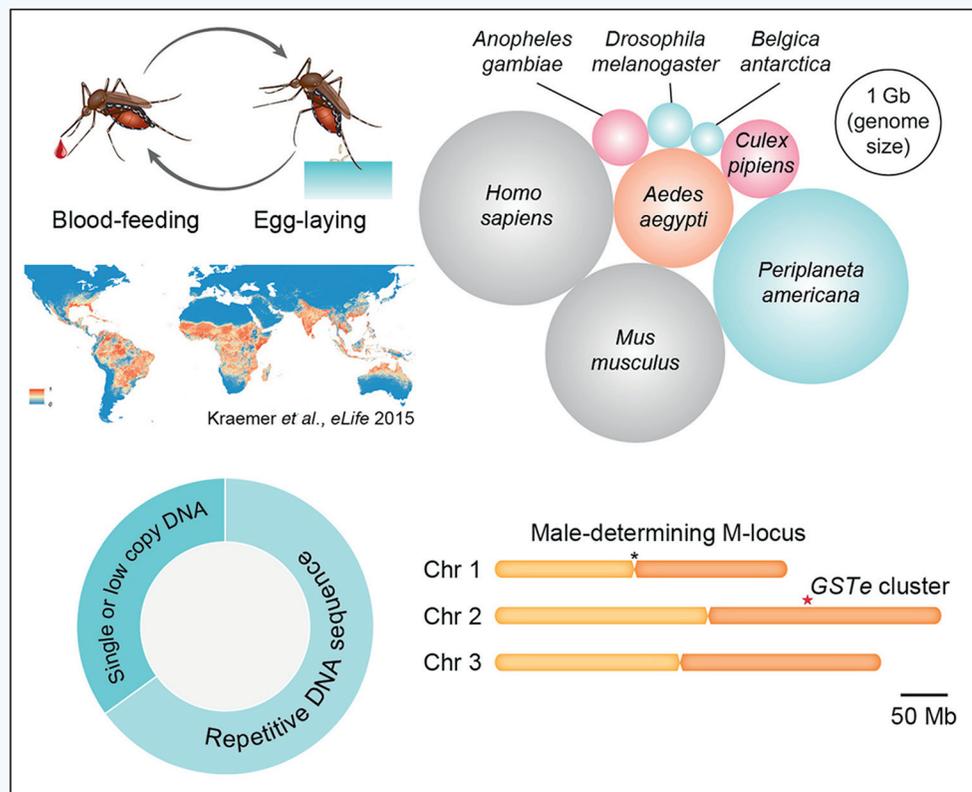


Aedes aegypti

Benjamin J. Matthews^{1,*}

¹Laboratory of Neurogenetics and Behavior, The Rockefeller University and Howard Hughes Medical Institute, New York, NY, USA



Trends in Genetics

The yellow fever mosquito, *Aedes aegypti*, is a vector of arboviral (arthropod-borne) pathogens that cause Zika, dengue fever, yellow fever, and chikungunya, and is found associated with human settlements across a large swath of the globe. A complete genome assembly and gene set annotation is critically important for understanding aspects of mosquito biology correlated with disease transmission, tracking the molecular basis of evolving insecticide resistance, and designing and deploying genetically based mosquito control strategies, including sterile insect technique and CRISPR/Cas9-based gene drives. The genome of *Ae. aegypti* is larger and more repetitive than many other commonly studied dipteran insects, and a recently updated reference assembly, AaegL5, presents a substantially more complete and contiguous assembly than previous efforts. Future work to catalog and study genomic variation in populations around the globe will facilitate understanding and control of this deadly disease vector.



Trends in Genetics

TAXONOMY AND CLASSIFICATION:

KINGDOM: Animalia
PHYLUM: Arthropoda
CLASS: Insecta
ORDER: Diptera
FAMILY: Culicidae
GENUS: *Aedes*
SUBGENUS: *Stegomyia*

GENOME FACTS:

The genome of *Ae. aegypti* comprises three chromosomes totaling ~ 1.25 Gb, with a repeat content of 65% (including >25% retrotransposons).

There are >14 600 annotated protein-coding genes in the *Ae. aegypti* genome, including 117 odorant receptors (ORs), 135 ionotropic receptors (IRs), and 72 gustatory receptors (GRs). These multigene families produce transmembrane receptor complexes that guide mosquitoes to human hosts and egg-laying sites.

Ae. aegypti chromosome 1 is a homomorphic sex chromosome. Male mosquitoes carry one copy with a small, dominant male-determining locus (the 'M-locus') near its centromere.

SPECIES FACTS:

Ae. aegypti are vectors of arboviral pathogens that cause hundreds of millions of cases annually of Zika, dengue fever, yellow fever, and chikungunya.

Only female *Ae. aegypti* blood-feed and do so to develop eggs. If a mosquito bites a human host with an active arboviral infection, virus can propagate within the mosquito and be transmitted to subsequent human hosts.

Most strains of *Ae. aegypti* are anthropophilic (prefer to bite human beings) and use a variety of sensory cues, including heat, carbon dioxide, and body odor, to locate hosts in their environment.

Larval and pupal mosquitoes are aquatic. *Ae. aegypti* lay eggs above the waterline of containers of fresh water, where they can remain dormant for months before hatching.

After laying eggs, female *Ae. aegypti* return to host-seeking, a behavioral pattern known as the 'gonotrophic cycle'.

*Correspondence: bnmthws@gmail.com (B.J. Matthews).



Fun fact about the Genome

There is significant copy number variation across strains in genes encoding glutathione S-transferases, enzymes linked to the detoxification of insecticides, such as DDT and pyrethroids. Gene amplification through duplication is one potential mechanism for the evolution of insecticide resistance.

Literature

1. Christophers, S.R. (1960) *Aedes aegypti* (L.), the Yellow Fever Mosquito: Its Life History, Bionomics and Structure, Cambridge University Press
2. Bhatt, S. *et al.* (2013) The global distribution and burden of dengue. *Nature* 496, 504–507
3. Kraemer, M.U.G. *et al.* (2015) The global distribution of the arbovirus vectors *Aedes aegypti* and *Ae. albopictus*. *eLife* 4, e08347
4. Leta, S. *et al.* (2018) Global risk mapping for major diseases transmitted by *Aedes aegypti* and *Aedes albopictus*. *Int. J. Infect. Dis.* 67, 25–35
5. Nene, V. *et al.* (2007) Genome sequence of *Aedes aegypti*, a major arbovirus vector. *Science* 316, 1718–1723
6. Severson, D.W. and Behura, S.K. (2012) Mosquito genomics: progress and challenges. *Annu. Rev. Entomol.* 57, 143–166
7. Matthews, B.J. *et al.* (2018) Improved reference genome of *Aedes aegypti* informs arbovirus vector control. *Nature* 563, 501–507
8. Esvelt, K.M. *et al.* (2014) Concerning RNA-guided gene drives for the alteration of wild populations. *eLife* 3, e03401