

Genetic Diversity of Dengue Mosquitoes

Prelims: Current events of national and international importance | Environment

Why in News?

*Recent genomic studies on *Aedes aegypti* reveal that human movement, rapid urbanization, and regional transport networks are actively shaping the species' genetic structure and high gene flow across India.*

Key Highlights of the Findings

- ***Aedes aegypti*** populations across different eco-climatic zones in India exhibit high genetic similarity despite long distances.
- Long-distance mixing is driven primarily by long-distance human transit (railways, highways, and logistics networks) passively transporting mosquitoes and their drought-resistant eggs across state borders.
- Unplanned urban growth, artificial water storage habits, and dense construction sites create abundant, micro-localized breeding grounds.
- This anthropophilic (human-preferring) niche buffers mosquito populations against local climate extremes, facilitating widespread interbreeding between urban and semi-urban lineages.
- Indiscriminate use of chemical vector control (like pyrethroid-based fogging and indoor sprays) has exerted strong selective pressure.
- This human-driven pressure accelerates the spread of specific knockdown resistance genetic mutations across distant populations.

Aedes aegypti

- **Origin** - Native to West Africa.
- The domestic lineage evolved a specialized preference for human blood and artificial water containers before spreading globally via international maritime and trade routes.
- **Bionomics** - Daytime biter, highly anthropophilic, and primarily breeds in clean, stagnant water held in artificial in and around domestic dwellings.
- **Co-circulating Vectors**- Works alongside *Aedes albopictus* (Asian tiger mosquito), which occupies more suburban/rural vegetation niches, complicating vector management.

Aedes aegypti

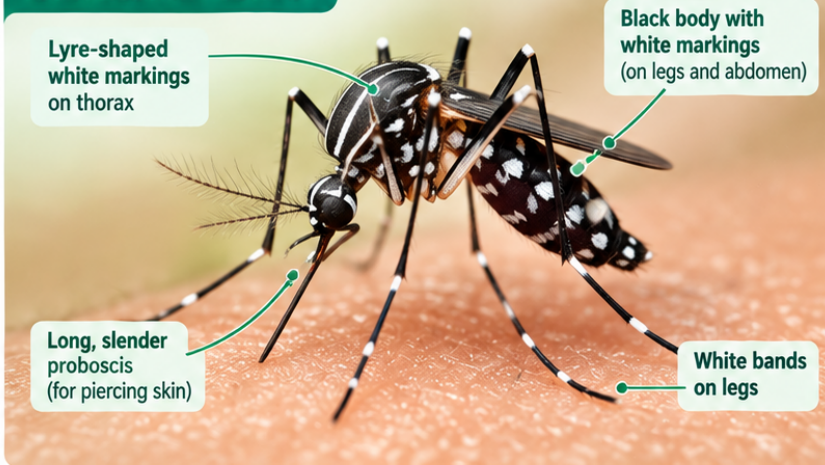
The Silent Vector

Small mosquito. Big health risk.



Aedes aegypti is a highly efficient vector of viral diseases, known for its preference for **human blood** and its ability to thrive in **urban environments**.

Identification Features



Quick Facts



Scientific name
Aedes aegypti



Order
Diptera



Family
Culicidae



Distribution
Tropical and subtropical regions worldwide (especially in urban areas)



Active period
Daytime (especially early morning and late afternoon)



Size
~ 4 – 7 mm

Common Breeding Sites



Stagnant water in containers



Flower pots and saucers



Discarded tyres



Water storage tanks



Blocked drains



Any clean, stagnant water



Breeds in clean, stagnant water (as little as a bottle cap of water).

Diseases Spread



Dengue
(DENV 1–4)



Zika
(ZIKV)



Chikungunya
(CHIKV)



Yellow fever
(YFV)

Aedes aegypti is the primary vector for dengue, Zika and chikungunya.



Why It Matters

- Drives outbreaks of vector-borne diseases.
- Thrives in urban and peri-urban areas.
- Hard to control due to its breeding habits and high human-to-human density.



Prevention

- ✓ Eliminate stagnant water.
- ✓ Keep surroundings clean.
- ✓ Use mosquito nets and repellents.
- ✓ Wear full-sleeved clothing.
- ✓ Community awareness and regular surveillance.



No stagnant water = Fewer mosquitoes = Healthier communities



Reference

[The Hindu | Genetic diversity of dengue mosquitoes](#)



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