ACHIEVEMENTS

Study Uncovers Origins of the Urban Human-Biting Mosquito: West Nile Virus Transmission and Vector Control Strategies

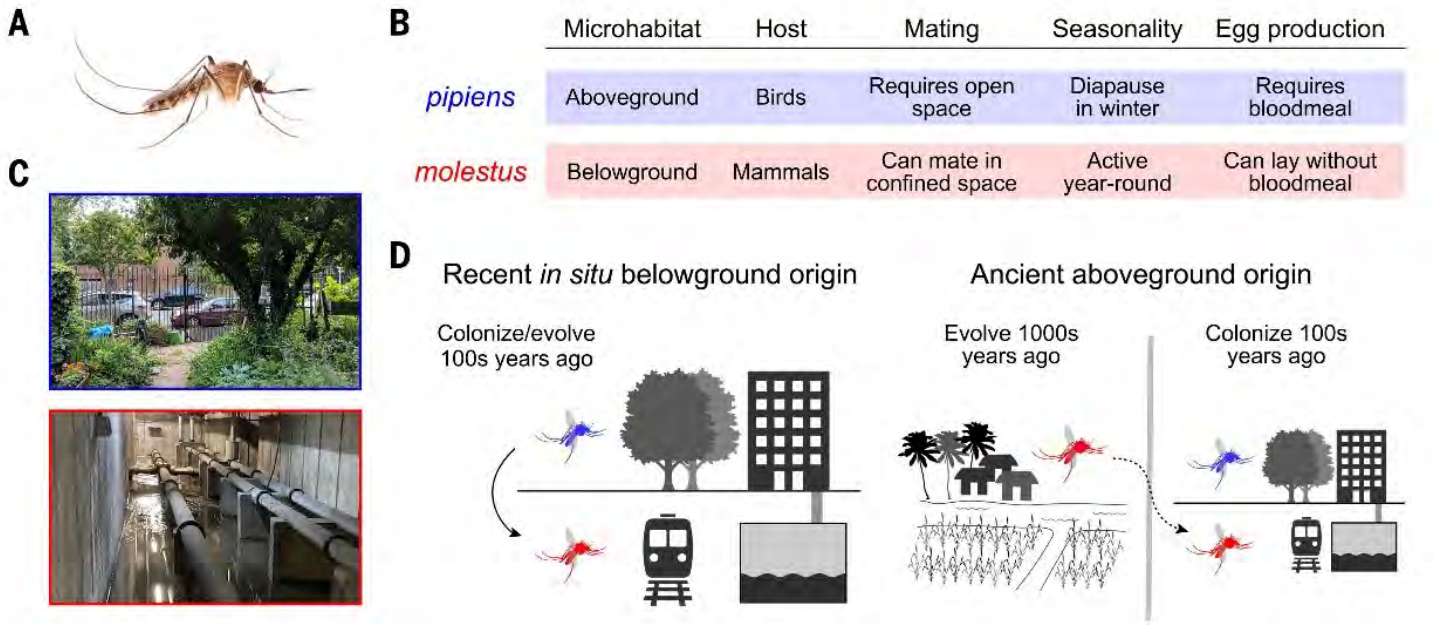

Fig. 1. Cx. *pipiens* form *molestus* behavior, ecology, and hypothetical origin.

For decades, scientists held that the human-biting mosquito Culex pipiens form *molestus* had evolved from the bird-biting Culex pipiens form pipiens in European subways about 200 years ago, serving as a textbook case of rapid urban adaptation. A recent study led by Princeton University, with NTU's Professor Kun-Hsien Tsai and alumnus Kai-Di Yu, disproves this theory. DNA evidence from 12,000 samples shows that *molestus* originated more than 1,000 years ago in the Mediterranean or Middle East, likely Ancient Egypt, where it first adapted to humans in early agricultural societies. The findings were published on October 23 in *Science*.

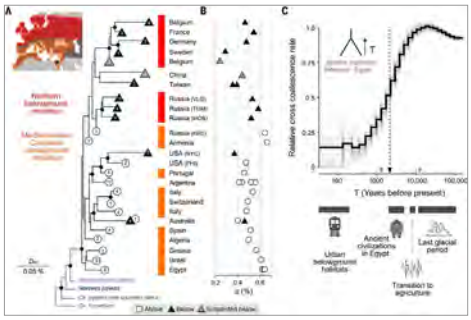

Fig.2 . Form *molestus* evolved thousands of years ago in the Mediterranean region.

"This mosquito became famous during WWII in London, seemingly adapted to underground life. But our DNA analysis tells a very different story," remarked Lindy McBride. First author Yuki Haba, now at Columbia University, coordinated global sampling and personally analyzed 800 specimens, confirming the species' ancient origins.

Click or Scan the QR code to read the full article published in *Science*.

In Taiwan, Tsai and Yu have long monitored underground mosquitoes, finding genetic differences between northern and southern populations. Their work suggests multiple lineages exist, likely due to repeated introductions or genetic exchanges.

Beyond revising a classic example of urban evolution, the study carries major public health implications. The West Nile virus, a bird virus that spills over to humans via mosquito bites, may have been influenced by hybridization between *molestus* and *pipiens*. While hybridization is less common than once thought, it does occur in large cities, raising concerns that urbanization promotes genetic mixing and increases transmission risks. Researchers emphasize the need for more sampling across urban and rural areas to clarify gene flow and biting behavior.

“Our work opens the door to investigating links between urbanization, hybridization, and spillover of viruses from birds to humans,” said Haba.

The study urges government agencies to support interdisciplinary research and integrate findings into urban planning, climate adaptation, and health policy. Recommendations include monitoring mosquito populations, strengthening vector control, promoting community health education, and combining evolutionary biology with ecology to build a stronger foundation for disease prevention.

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