Culex pipiens Complex

NZ Status: Not present – *Culex pipiens* (the *molestus* form and *Cx. pipiens pallens* are Unwanted Organisms), *Culex australicus*, and *Culex globocoxitus*. Introduced – *Culex quinquefasciatus*

(https://cameronwebb.wordpress.com/2013/08/05/the-london-down-underground-mosquito/)

Culex pipiens complex is a group of globally distributed mosquitoes known for spreading diseases such as West Nile virus, St. Louis encephalitis, Rift Valley fever, and dog heartworm. The complex consists of *Culex pipiens, Culex quinquefasciatus, Culex australicus*, and *Culex globocoxitus*. Their presence varies by region, with some species being native, introduced, or classified as unwanted organisms due to their role in disease transmission.

In New Zealand, *Culex pipiens* (molestus form and *Cx. pipiens pallens*) is considered an unwanted organism and is not currently established. *Culex australicus* and *Culex globocoxitus* are also absent, while *Culex quinquefasciatus* has been introduced. Mosquitoes from this complex are frequently intercepted at airports and shipping ports, arriving via aircraft, cargo, and imported goods. These interceptions highlight the need for biosecurity measures to prevent establishment.

Border Interceptions in New Zealand

New Zealand has intercepted members of the *Culex pipiens* complex at airports and shipping ports multiple times, including:

- Live mosquitoes from Shanghai found in air cargo shipments.
- A male Cx. pipiens pallens discovered at Auckland Port, arriving from Japan.

- Cx. australicus specimens detected at Christchurch and Dunedin Airports from Australian flights.
- Cx. quinquefasciatus frequently intercepted, though it is already established in New Zealand.

These incidents emphasize the ongoing challenge of preventing exotic mosquito species from establishing in New Zealand.

Disease Transmission and Public Health Impact

Mosquitoes in the Culex pipiens complex are important disease vectors, transmitting:

- West Nile virus, which affects both birds and humans.
- St. Louis encephalitis, a virus that can cause severe neurological issues.
- Rift Valley fever virus, impacting both humans and livestock.
- Dog heartworm (Dirofilaria immitis), a parasitic disease affecting dogs.
- Bancroftian filariasis, linked to *Cx. pipiens pallens* in China.
- Bird malaria (Plasmodium relictum), threatening bird populations.

A major concern is the mosquitoes' role as bridge vectors, meaning they bite both birds and humans, facilitating disease transmission between species. This is particularly significant for viruses like West Nile virus, which spreads from birds to humans.

Geographic Distribution and Hybridization

The Culex pipiens complex is found across North America, Europe, Africa, Asia, and Australia. While *Cx. pipiens* originated in Europe and Africa, it has spread worldwide due to human activity and climate change. These mosquitoes adapt well to both urban and rural environments.

Hybridization is common, especially where species overlap. *Cx. pipiens* and *Cx. quinquefasciatus* frequently interbreed, creating hybrids that may be more adaptable and better vectors due to their ability to bite both birds and humans.

Habitat and Behavior

Different species within the *Culex pipiens* complex have varied habitat preferences:

- Cx. pipiens f. pipiens breeds in ponds, marshes, and rice fields.
- Cx. pipiens f. molestus thrives in sewers, drainage systems, and polluted water.
- Cx. quinquefasciatus breeds in nutrient-rich standing water, artificial containers, and septic tanks.
- Cx. australicus and Cx. globocoxitus are found in rural areas and rarely bite humans.

Prevention and Control

To prevent the spread of the *Culex pipiens* complex, key measures include:

1. Surveillance and Monitoring – Detecting incoming mosquitoes at ports and airports.
2. Public Awareness Campaigns – Encouraging people to eliminate standing water.
3. Molecular Testing – Identifying mosquito origins through DNA analysis.
4. Vector Control Measures – Using insecticides, larvicides, and biological control.
5. Climate Adaptation Strategies – Understanding how rising temperatures affect mosquito populations.

Conclusion

The *Culex pipiens* complex is a major global disease vector, affecting humans, animals, and ecosystems. While New Zealand has prevented their establishment, frequent border interceptions require ongoing vigilance. By improving biosecurity, monitoring, and public awareness, the risk of these mosquitoes spreading can be minimized. Hybridization remains a concern, as hybrids may be even more effective disease carriers. Continued research and genetic analysis will be essential in controlling mosquito populations and preventing future outbreaks.

If some of these mosquitoes become established in New Zealand, they could introduce new diseases and become a serious public health concern. Monitoring and preventing their spread is crucial to protecting both people and animals.