

DIDEEBYCHA

GMCA Newsletter

Eastern Equine Encephalitis

Eastern equine encephalitis virus (EEEV) is a lethal *Alphavirus* transmitted by *Culiseta melanura* that primarily cycles between birds. EEEV occurs in the eastern, Gulf Coast, and north-central regions of the United States, as well as parts of Central and South America and the Caribbean. Horses in areas with dense mosquito populations—such as swamps, coastal marshes, and coves—are at heightened risk. Although rare, infections in humans and horses are associated with high mortality rates and severe neurological effects. Other mosquito species that feed opportunistically on mammals have been incriminated as bridge vectors to humans and horses. Climate change appears to be increasing the spread of this virus.

EEEV is perpetuated in an enzootic cycle involving ornithophilic mosquitoes (primarily *Culiseta melanura*) and passerine birds in freshwater swamps. Human and equine cases occur infrequently despite relatively high rates of EEEV infection in *Cs melanura* during virus amplification. Other mosquito species such as *Aedes vexans*, *Coquillettidia perturbans*, *Ochlerotatus canadensis*, and *Oc sollicitans* have been implicated as epidemic/epizootic bridge vectors from viremic birds to horses and humans. These species are competent vectors of EEEV and may acquire virus infection during disease outbreaks by feeding occasionally on birds but prefer mammalian hosts. Susceptible hosts are usually

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2025 GMCA Annual Meeting

The GMCA meeting was back in Athens again this year, with a small but actively participating group and many great talks. The Government shutdown unfortunately prevented some of our members and speakers from attending, but we still managed to have an interesting meeting.

We actually had some poster sessions presented by several students from Andrew Haddow's lab at Kennesaw State. The students did a great job explaining their work. We hope to have more poster sessions in the future.

We hadn't been at UGA for a meeting in a couple of years, and the facility had gone through a face-lift. We were in a large room with a place for the association to have a table, our vendors to set up, posters to be displayed, and for talks to be given. As always, we appreciate the support our vendors provide. Additionally, this year the KSU students were provided with their meeting registrations by Vesperis, while Azelis provided funding for 2 people to attend the meeting who would not have been able to otherwise.

We also had a guest speaker at the banquet. Dr Lawrence Reeves, an entomologist and molecular ecologist at the Florida Medical Entomology Lab talked about the natural history of mosquitoes. It was especially interesting to hear about mosquitoes of the genus *Malaya* that have a unique and specialized relationship with certain ant species, specifically the genus *Crematogaster*. Unlike most mosquitoes that feed on blood, *Malaya* spp are kleptoparasites, meaning they steal food from ants by feeding on their regurgitated stomach contents.

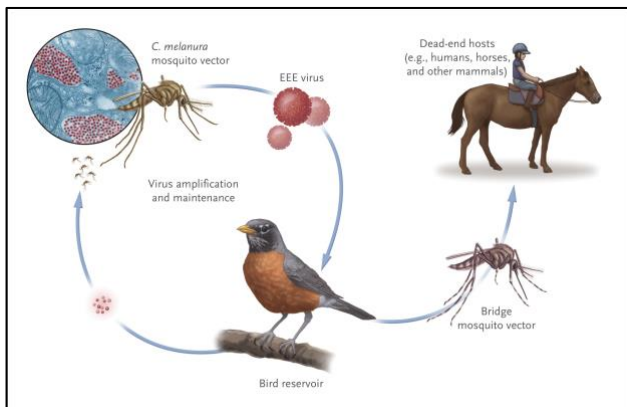


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dead-end hosts, such as equine species (horses, zebras, donkeys, etc.), humans, other birds (emus, ostriches, owls, etc.), or other livestock species (e.g., swine and cattle). EEEV is especially severe in horses, with mortality rates up to 90%. Survivors often suffer permanent neurological damage. In humans, approximately 30% of those with severe EEEV die from the infection. It primarily affects the elderly and the very young, typically causing death in the elderly and severe brain damage in the young.

In Georgia, EEEV is endemic “below the fall line” in South Georgia’ coast and coastal plains areas but not often seen in the piedmont and mountain areas. *Culiseta melanura* primarily inhabits lowland swamp areas with acidic water, where its larvae develop in underwater root systems of deciduous and cedar trees and other water-filled cavities. *Culiseta melanura* is not/rarely a mammal feeder, so a bridge vector that feeds on both birds and mammals is needed to transmit the virus to horses and humans. This is one reason why we see fewer cases of EEEV than WNV, because the life cycles of two different mosquito species and the life cycles of the birds need to mesh to get the virus from the birds to the humans or horses.

In 2025, Fulton County reported 2 EEEV+ mosquito pools. As to why we are seeing this increase in Fulton County, I do not know. It may be that *Cs melanura* habitat has developed somewhere in the area. *Culiseta melanura* will fly ~5 miles in search of a blood meal. It is more likely that infected birds ended up in the area and *Culex quinquefasciatus*, which feeds on birds and mammals, has kept the virus circulating. Since *Cx quinquefasciatus* will feed on both birds and mammals, this increases the risk of EEEV in the area.



Presentations will be posted on the GMCA website (<https://www.gamosquito.org/Presentations.htm>) in November. Meeting notes will also be available.

Next year’s annual meeting will be at Jekyll Island from October 21-October 23, 2026.



Overwintering in Mosquitoes

One of the talks given at the GMCA Annual meeting was Mike Riles' talk on overwintering in mosquitoes. What we know about diapause comes from the accumulated efforts of scientists who have been studying it since at least 1937 when they first gave the phenomenon its name. Diapause is a complex state of arrested development that allows mosquitoes, and other insects, to survive unfavorable environmental conditions.

Mosquitoes overwinter through dormancy in several ways, depending on the species, primarily through diapause (a hormonally regulated state of suspended development in adults or larvae) or quiescence (a more immediate, less-developed state where adult females die but their eggs survive until warmer temperatures return).

Diapause is a state of suspended development where a mosquito's metabolism slows significantly in response to short daylengths and low temperatures. Some mosquito species overwinter in the egg stage. These eggs can actually remain dormant for several years. The most common mosquitoes that overwinter at this stage are *Aedes* and *Psorophora* species. Some mosquito species overwinter as 4th instar larvae. This is hormonally regulated by ecdysone, which is a steroid hormone in insects that is derived from cholesterol and plays a crucial role in mediating developmental transitions, particularly during metamorphosis, by regulating the timing of ecdysis and the transition to a new life stage. Some mosquito species overwinter as adults. This occurs in *Culiseta*, *Culex*, and *Anopheles* species. The adults find warm sheltered areas in which to spend the winter. During diapause, mosquitoes undergo a number of physiological changes, including reduced metabolic rate, increased fat accumulation, decreased reproductive activity, altered immune response, and changes in gene expression. Diapause ends when days become longer and temperatures rise.

Quiescence is an immediate response to environmental factors. Quiescence is a type of irregular dormancy (non-seasonal) characterized by slowed metabolism and directly resulting from unfavorable environmental conditions, including low humidity and high temperatures. Quiescence is a less complex biological trait that does not depend on endogenous control for its initiation. In mosquitoes, quiescence has been primarily observed in the egg, reflected in the resistance to desiccation that allows the embryo to survive in dry conditions.

Dormancy is part of the life history of many mosquito species, providing a mechanism to overcome unfavorable seasons in tropical and temperate zones. Dormancy contributes to the establishment, maintenance, and natural spread of the mosquito species. The study of invasive species such as the Asian tiger mosquito has shown that the timing and establishment of the diapause can evolve rapidly. During their expansion along different climatic gradients, mosquito populations have been adapting to the signals that trigger the diapause, advancing or delaying it.

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