

The consequence of this month's treetop music and mating will be the billions of nymphs that eventually drop to the ground where they burrow into the root systems and feed and molt until they re-emerge for another cycle of metamorphosis and making whoopee, in 2038.

Well, maybe.

We've known about, recorded, studied, and timed the broods for nearly two hundred years. Researchers have identified the unique genetics of each brood species, and they've found that the cicada cycles are variable.

Last year's Brood IX was joined by an unexpected emergence of another brood that was **4 years early**. A 13-year cicada woke up after just 9.

Not the first time, either. Our Brood X did the same thing back in 2000 (not 2004). Four years earlier than anticipated, a huge swarm of Brood X emerged in Ohio, did the mating and disappeared. Seventeen years later, 2017, these guys emerged back on schedule, likely forming a new, splintered brood.

Last year, not one, but four of these predictable periodic broods emerged off-cycle.

Interesting. Relevant?

Turns out that the soil temperature, and climate change, may be affecting cicada emergence patterns. The conditions that alter the maturation attributes of these incredibly long-lived insects should make us take notice. Other bugs are changing, too.

Mosquitoes are another, more obvious, responder to climate changes that alter life cycles. Because we can follow them in greater detail and over many more generations, we can measure climate influences on mosquito range and evolution.

Our Utah mosquito season is ramping up. The past couple years have seen new species of skeeters moving into areas of the State where they have never been observed or expected. And ranges are expanding across the country, and the world, as climate norms are changing to allow greater penetration of habitat. An expanding range also means longer seasons, and more generations of disease-carrying vectors.

While cicadas are harmless to humans, mosquitoes are not. The changes in their ranges will mean more malaria, dengue, chikungunya, yellow fever, and Zika across the map. And Utah is poised to join the club of regions where these diseases become endemic.





{Mosquito season is here. *Aedes aegypti*.}

Moab, Utah, saw invasive *Aedes aegypti* in 2019. Modelling predicts that the insect is moving steadily northward and not just here, but across the world.

Lesser known, or appreciated, are the bugs moving North that cause Chagas disease, kissing bugs. These guys are related to the cicada but are blood-sucking, hematophagous insects, and transmit *Trypanosome cruzi* parasites. Untreated, 30% of patients can develop potentially life-threatening heart and gut complications. These insects are being found in areas of Utah where they have never before been seen.



{*Triatominae*, like cicadas, are of the *Hemiptera* family.}



The Brood X cicada emergence is a remarkably noisy and notable event. Changes in emergence patterns are a reminder of the power of our environment on species range and evolution. These changes should make noise, and we should take note, too.

The influence of environment on vectors of disease is something that we must be aware of in anticipating and predicting the emergence patterns of disease.

Have a great week and be safe,

Bryan

p.s. Cicada males have a special structure on their abdomen called a **tymbal**, which contains a series of ribs that buckle one after the other when the cicada flexes. As it buckles, the ribs “click” causing the buzzing sound.

