

STANDARD DEVIATIONS: New Kid on the Block

Greetings,

No biosafety this month! **How can I keep your attention if the only thing I talk about is flogged over and over?** Let's stretch our wings and imaginations a little.

Today I'm presenting a new discovery in Parasitology. I think these things are pretty neat; the stuff everyone crowds around the scope to look at when we stumble across them in the lab, right? This is that kind of cool.

Brazilian scientists recently identified a parasite that has infected more than a hundred people in the Northeast, causing severe liver, spleen and skin damage and killing at least one of these patients. https://wwwnc.cdc.gov/eid/article/25/11/18-1548_article

Clinically, it looks like visceral Leishmaniasis. It's not. Genetically, it's a bug that usually only infects other bugs (insects). Yet, here it is, and the transmission may involve *Culex* mosquitoes. These are the girls that bite us in our own, Utah, back yards.

Leishmaniasis are parasitic trypanosome diseases caused by at least 20 species of the genus *Leishmania*, and are transmitted between mammalian hosts by female sandflies. Around a million cases get reported each year and there may be tens of millions affected. It's the disease we know in its **cutaneous** form as "Baghdad Boil" in US soldiers serving in the Middle East.

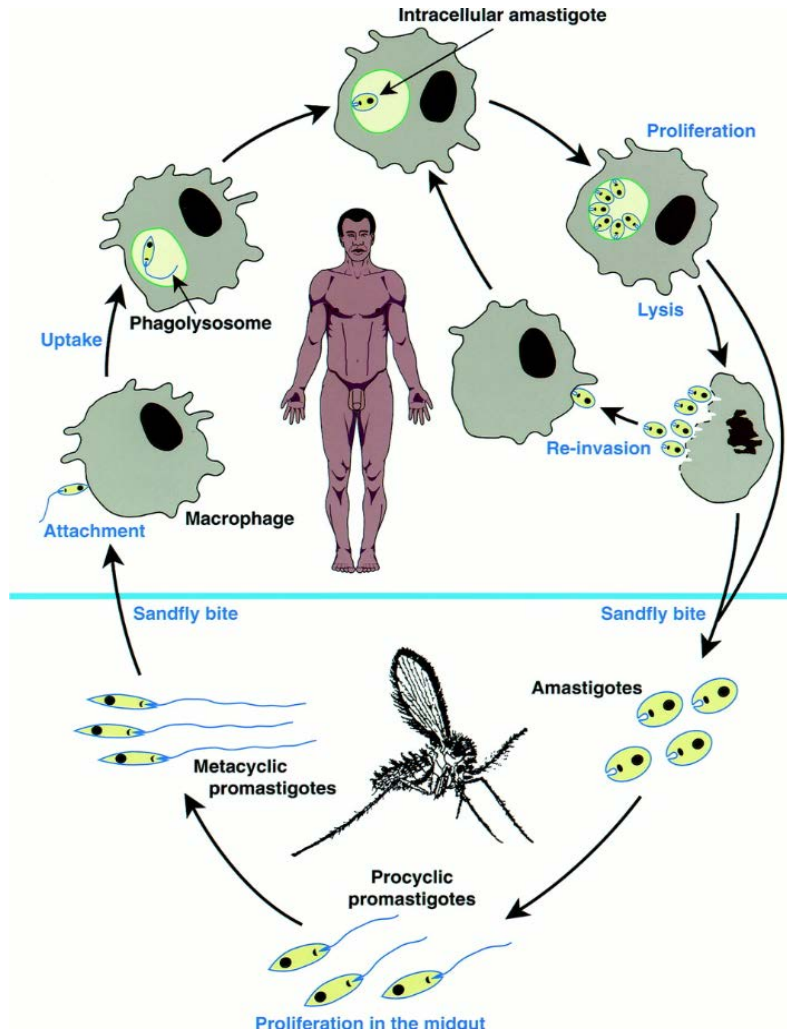


More than 1000 soldiers affected.



Visceral Leishmaniasis (VL) is the second most deadly parasitic disease in the world (malaria is #1), and is responsible for an estimated 20,000-40,000 deaths/year.

Here's the cycle:



ASM.org

Once inside the body the parasites pass through different stages of their life cycle, reproduce inside macrophages, and migrate to the liver, spleen and bone marrow. Symptoms include fever, weight loss, anemia, and damage to the liver and spleen. Untreated, the disease is almost always fatal. And there are no good drugs. Even topical drugs for cutaneous disease are fraught with side-effects.



The parasite vector is a sand fly and the endemic range has been fairly localized. In the Americas, the disease range has spread up from Brazil into Mexico and has now been seen recently in Texas and Southern Oklahoma.



New World distribution: genus *Leishmania*

This new bug that has just been found in Brazilians seems to mimic the *Leishmania* parasite, but its genetic makeup is related to another genus of trypanosome, *Crithidia*, that have only been parasitic in insects, previously (bees, for example).

To determine the cause of this new disease, researchers cultured parasites taken from the patients' bone marrow and skin lesions, sequenced their genomes, and discovered that **the parasites were not closely related to known *Leishmania* parasites. Instead, they were more closely related to *Crithidia fasciculata***, a parasite that usually colonizes mosquitoes. The study demonstrated its ability to infect mammals (mice). What they haven't nailed down is the vector. But *Crithidia* are found in *Anopheles* and *Culex* mosquitoes (and bees).

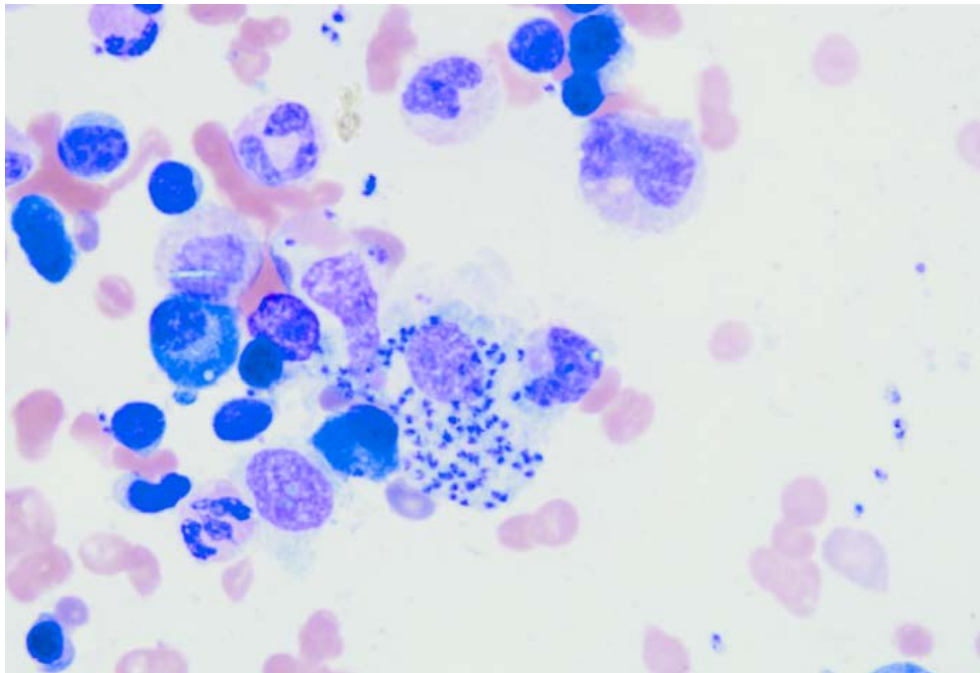
The *Culex* mosquito is Utah's most commonly trapped and tested. The diseases they vector already include arbovirus infections such as West Nile virus, Japanese encephalitis, and St. Louis encephalitis, but also filariasis and avian malaria.



One hundred forty-one human cases of the new parasite are known. The actual number is probably much higher. A jump from invertebrates to any mammalian species is startling and portends a new realm of threat. The possibility that the vector is one that inhabits our environment is good reason for us to be aware of this new, evolving, human parasite.

Here's the thing that really gets me thinking: Parasitic disease, such as malaria and Leishmaniases, have killed untold millions of humans. Now, a *Crithidia* parasitic infection is poised to join that little club. It has crossed from insects to humans; and it causes a disease resembling the second deadliest in the world. Our most common mosquito may be a vector for the organism causing disease in humans. What risk message is that sending?

Our work on the bench benefits by awareness of emerging infectious disease. This is the stuff we love to find and the news we need to be better at our job.



Leishmania-infected bone marrow (Wright Giemsa stain)

Have a great week and be safe,

Bryan

p.s. Biosafety message for this week – If you can't close that lab coat, maybe you shouldn't wear it.

