STANDARD DEVIATIONS: Expecting Ebola?

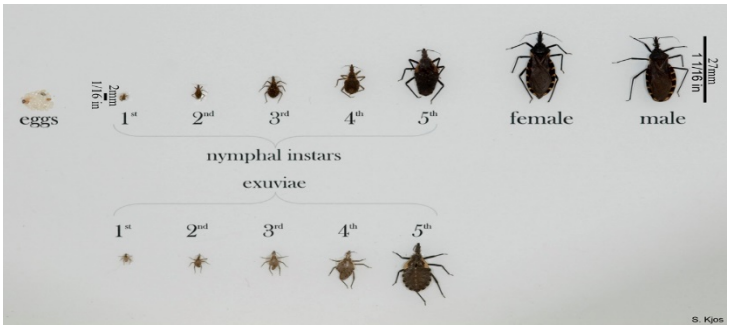
Everyone,

Emerging disease. Just around the corner and coming to a lab near you. Only it isn't Ebola, yet. Disease evolution is a dynamic we have had to contend with for, well, forever. And the future is not going to be any different. Understanding that allows us to evolve alongside those problems and be better prepared to adapt and anticipate the tests we'll see and risks we'll face.

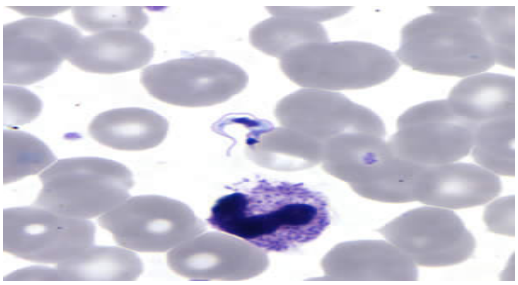
Here are some emerging concerns that we should be considering in our thinking about what Utah labs of tomorrow will testing. These are things we see from afar but that we should have on our radar.

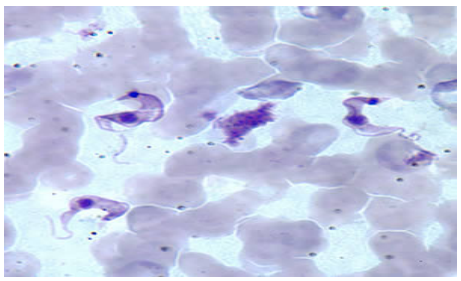
Chagas. The impact of Chagas disease is not limited to the rural areas in Latin America in which vector borne transmission occurs. More than **300,000 people in the United States are infected with *Trypanosoma cruzi*,** and most are undiagnosed. Largescale population movements from rural to urban areas of Latin America and to other regions of the world have increased the geographic distribution and changed the epidemiology of Chagas disease. In the U.S. and in other regions where Chagas disease is now found but is not endemic, control strategies should focus on preventing transmission from blood transfusion, organ transplantation, and mother-to-baby (congenital transmission).

It is caused by the parasite *Trypanosoma cruzi*, which is transmitted to animals and people by insect vectors (triatomine bug). Eleven different species of triatomine bugs have been found in the southern United States. Last year "Kissing bugs" were recovered in Southern Utah (Springdale) and submitted to UPHL for identification.



The primary assay is a Giemsa stained smear for the organism, ala Malaria:

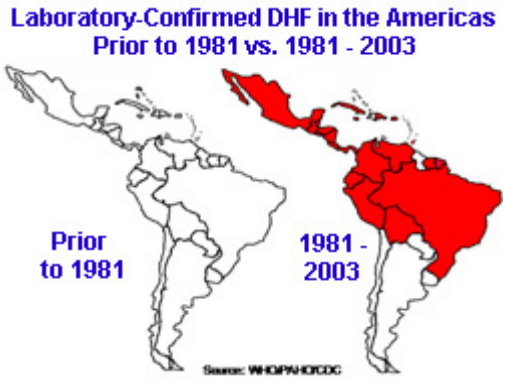




So I'd imagine it as a send out or path review kind of test, but we're used to looking for these kind of oddities and shouldn't be too surprised to stumble on them in a diff slide. Diagnosis of chronic Chagas disease is made by serologic tests (ELISA and IFA) for antibody to the parasite. There are screening tests for blood products.

Dengue. Dengue is a mosquito-borne viral disease that has rapidly spread in recent years. Before 1970, only 9 countries had experienced severe dengue epidemics. The disease is now endemic in more than 100 countries in regions of Africa, the Americas, the Eastern Mediterranean, South-East Asia and the Western Pacific. One recent estimate indicates 390 million dengue infections per year, of which 96 million will manifest clinically. Another study, of the prevalence of dengue, estimates that **3.9 billion people, in 128 countries, are at risk** of infection with dengue viruses.

There are 4 distinct, but closely related, serotypes of the virus that cause dengue (DEN-1, DEN-2, DEN-3 and DEN-4). Recovery from infection by one provides lifelong immunity against that particular serotype. Subsequent infections by other serotypes increase the risk of developing severe dengue. Although similar in character to Zika, dengue is, clinically, a much more concerning virus. Most dengue cases in U.S. citizens occur in those inhabitants of Puerto Rico, the U.S. Virgin Islands, Samoa and Guam, which are endemic for the virus. The *Aedes aegypti* mosquito is the primary vector of dengue and was identified in Nevada recently (2016). *Aedes albopictus*, a secondary dengue vector in Asia, has spread to North America and both are headed our way (North) as the climate becomes more accommodating. There is an *Aedes* species found in Utah, *Aedes vexans*, and its ability to harbor this virus would be a significant epidemiological finding.



The likelihood of being asked to assay for this condition will certainly increase for Utah laboratories. UPHL performs Zika MAC-ELISA which cross-reacts with Dengue and requires CDC confirmation to differentiate the two viruses. Our Trioplex RT-PCR also picks up dengue (along with Zika and chikungunya).

Now, there are a plethora of other disorders headed this way; these are two that exemplify the dynamics of disease spread observable in our temporal window. At our altitude and latitude, these diseases may never become endemic, but testing for them will likely increase (like Zika). Hantavirus, West Nile, tick-borne disease, etc. are already around and increasing our test volumes and biohazard risk. Urbanization, international travel, climate change, and vector control are aspects of transmission and propagation we will see altering our laboratories'

workload. Recognizing the changing landscape of lab analysis will prepare us for the challenges and risks on the horizon, and, of course, biosafety will be part of that picture.

Have a great week and be safe,

Bryan

References:

www.who.int/news-room/fact-sheets/detail/dengue-and-severe-dengue

www.iamat.org/blog/thinking-about-the-spread-of-dengue-and-its-prevention/

www.cdc.gov/parasites/chagas/

www.cdc.gov/dengue/epidemiology/index.html

www.who.int/news-room/fact-sheets/detail/chagas-disease-(american-trypanosomiasis)