History/Microbiology Podcast 1 - The 1915 Dengue Epidemic in Porto Rico [1]

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Calificación:

History/Microbiology Podcast 1 - College of the Holy Cross

The 1915 Dengue Epidemic in Porto Rico

By: *Kaz Colon, William Hamilton, Lauren Kuhar, Katherine Lenahan, Caroline Russell*

Kaz: The report was entitled The Epidemic of Dengue in Porto Rico; 1915 written by Dr. W. W. King and focused on the infectious disease known as Dengue fever. The aim of the study was to research and investigate the Dengue fever cases in Puerto Rico and the outbreak - and to confront the incorrect assumptions about Dengue and the incorrect mortality rate that the United States had published in previous literature.

Katherine: So what is Dengue Fever anyways?

Will: Dengue fever is a viral illness found in subtropical and tropical regions, and remained an endemic disease in Puerto Rico, which we will talk about later in this podcast. Dengue is caused by a virus of the genus Flavivirus. This virus takes the shape of an enveloped icosahedral capsid, which basically looks like a soccer ball composed of lots of fun triangles.

Caroline: Dengue fever is carried by mosquitoes and infects human hosts by direct contact through the bite of an infected mosquito. The virus then carries out its functions in a human's immune system, blood vessels, and liver. Dengue fever has an incubation period of 4-10 days at which point a variety of symptoms manifest themselves. Speaking of symptoms, what exactly are they Lauren?

Lauren: Well Caroline, these symptoms include headache, muscle, bone and joint pain, nausea, vomiting, pain behind the eyes, swollen glands, and rash. In rare cases, a Dengue infection can develop into Dengue hemorrhagic fever which puts patients at risk of death because of organ failure and severe bleeding.

Will: But don't worry, Dengue is treated primarily with fluids and pain relievers that contain acetaminophen, and only the severe cases require hospitalization. In Brazil and Mexico scientists are even developing a vaccine known as Dengvaxia, which will hopefully become available on the global level soon.

Caroline: But now, let's get back to the presence of Dengue in Puerto Rico during the early twentieth century…

Kaz: According to Dr. King's article, "Dengue is apparently endemic in Porto Rico and has at times assumed more or less epidemic prevalence without having much attention paid to it." (565)

Will: The disease prior to the outbreak considered Dengue fever endemic and at times has epidemic prevalence. This article reports the epidemic outbreak that started in mid September of 1915.

Caroline: What exactly is the difference between endemic and epidemic?

Lauren: Great question Caroline! An endemic disease is constantly present in a population, usually at low incidences.

Will: Contrastingly, an epidemic disease occurs in a large number of people in a population at the same time. So, specifically, when was Dengue considered epidemic in Puerto Rico in 1915?

Caroline: The article reports that in mid September, there was an increase in the number of Dengue cases and this remained until the late part of October when it began to decline. From November to February the disease declined and it was at this time they declared the epidemic prevalence of the disease has having ended. Cases began coming up in March and at this time, they realized the disease had become more sporadic.

Will: What does it mean if the disease is sporadic?

Lauren: Sporadic diseases are diseases that occur occasionally at different times.

Katherine: This quote is a prime example of the history of neglect that Kaz and I have been studying. The federal Historical commentary: This is an example of the history of neglect that Puerto Ricans have endured, as the federal government did not provide adequate forms of drainage and sewage systems to mitigate disease. However, Dr. W.W. King also uses language that indicates that the Puerto Ricans are the ones to blame. For instance, the Downs v. Bidwell case establishes that the U.S. Government does not view Puerto Ricans as full citizens and does not grant them the same support as mainland citizens. This occurred in forms of racism that severely undermined any development efforts. I find this to be a salient point to bring up in relation to Dr. King's document because it provides evidence for the history of neglect that Puerto Rico has endured for decades.

Kaz: Misdiagnosis of reported cases also played a role in the ineffective response to the epidemic...

Katherine: Dr. King also discusses the role of the Board of Health in the Dengue epidemic, "returning in October, I learned of an unusual number of fever cases in San Juan: that certain of them had been reported as yellow fever, and that this had been officially denied by the Board of Health, which had stated that the so-called yellow fever cases were various diseases including Dengue." (566)

Will: There were actually no cases of yellow fever, cases listed as such were misdiagnosed and altered the correct mortality rate. For those of you who have no idea what the mortality rate is, it is the number of deaths, while morbidity is the total number of cases. In regards to the mortality of the disease, it was extremely low. This is one of the areas of information that the article clarifies, seeing that the United States reported an inaccurate mortality number, saying that it was as high as 80%. The article talks about how this was not true and that severe cases of Dengue which are fatal are very rare. Despite the low mortality, there was however a high morbidity rate of the disease.

Lauren: What was the morbidity rate of the disease?

Caroline: The high morbidity of the disease occurred during September and October, however, the exact number of cases is not available. The article reports that it ran into the hundreds and thousands.

Will: So were there any known immunities in the population?

Lauren: There was no known immunity that was found on the island during the outbreak of Dengue. But, scientists did conclude that people with weakened immune systems and second or subsequent Dengue infections were at greater risk for developing Dengue and even developing into the more severe stages of Dengue fever.

Historical Commentary:

Katherine: Trujillo-Pagan comments on the nature of medicine practiced by the U.S. military on the island, in terms of "the white man's burden," which explains the inherent bias and issues in relation to the quality of care. She argues, "The illusion of objectivity and value-neutrality supported colonial medicine's ability to articulate and legitimize knowledge about the body and its need for external intervention and development. Medicine also fabricated colonial difference and reproduced the colonial order." p .614 (Trujillo Pagan).

Kaz: The advancement of medicine in Puerto Rico has largely been supported by the United States efforts to colonize the island. Evidently, many of the doctors who performed research and controlled the Superior Board of Health were military doctors. In fact Doctor King served as the Chief Quarantine Officer. This is indicative of the colonial lens and perhaps racial bias that was used in the research we have.

Note: {"Yellow fever had not been reported in Porto Rico during the seventeen years of the American occupation and, if it had appeared it was important to me, as chief quarantine officer of Porto Rico, to know it at once and to determine, if possible, how it had entered the island." (566).}

Commentary: We know the role of the author, which is critical to take into consideration, as he will probably align with the interests of the people.

Kaz: Another factor to consider is the layout of Puerto Rico…

Katherine: "Rural dwellers apparently escaped except when they contracted the disease in the city… The topography, etc., of San Juan may be of interest. The city properly lies at the western end of a rocky island approximately three by one-half miles. It is compactly built, with very few open spaces except streets, and with little vegetation." (Dr. King, 567)

Will: This urban environment mentioned above meant for some serious consequences when Hurricane San Triburcio hit Puerto Rico in August of 1915. This resulted in abnormal temperatures, periods of high winds, humidity and rainfall. Ideal weather, am I right? San Juan, one of the cities mentioned in the study, experienced a minimal pressure in San Juan of 29.77 inches of mercury or 1008 millibars and winds of 62 mph". Moreover, the hurricane resulted in in an increase in rainfall and flooding creating more breeding grounds for mosquitoes. In the destruction following the hurricane, many people in urban areas were forced outside in cleanup efforts and there were many people outdoors who were highly vulnerable to mosquito bites (and thus contracting Dengue fever). The compact nature of the urban environment meant that there were many chances for the increased mosquito population to infect humans.

Caroline: This was made even worse by certain environmental characteristics of the island…

Katherine "Approximately one-half mile further eastward, across mangrove swamps and a channel connecting the ocean and the bay, begins the suburb of Santurce, a residence district of all classes according to the section. It occupies a broad sandy ridge well elevated and well drained in the central part but with other portions low and poorly drained." (568)

Caroline: The swamps on the island provided mosquitos with the perfect environment to breed in, due to the nature of the stagnant water. In turn, this increase in breeding results in an increase of the presence of Dengue. No need to fear though!

Because there are possible ways to prevent Dengue, including controlling the mosquito population.

Lauren: Any ways to prevent Dengue?

Will: Heck yes! The main form of prevention is to control the mosquito population by avoiding the buildup of stagnant water as well as by spraying insecticides. Additional personal steps that can be taken are using mosquito repellent and wearing long sleeved clothing when outside. December - anti mosquito measures (possibly drove decline in cases).

Caroline: I'm quite curious, were there any immunities that people had during this time?

Lauren: Well, in regards to possible immunities, there was no known immunity that was found on the island during the outbreak of Dengue.

Caroline: Okay thank you for answering, I was also wondering were there any people that were more at risk to developing Dengue?

Will: Yes, people with weakened immune systems and second or subsequent Dengue infections were at greater risk for developing Dengue or for developing severe cases of Dengue.

Katherine: Going off Will and Lauren's points, it's clear that Afro-descendants in urban settings were more susceptible to contracting Dengue due to the poor living conditions. Trujillo-Pagan finds, "Like the officially condemned but tolerated unhygienic housing conditions, there were other serious environmental problems in Puerta de Tierra produced by human inhabitants. Even in an age when sewage systems and waste disposal were generally primitive, some of the conditions shocked health officials but were still not corrected. Although there were changes in organization and emphasis in public health administration after US occupation, there were continuities with the Spanish colonial system as well." (p. 507 Trujillo-Pagan)

Kaz: Historical Commentary: Doctor King establishes that the issue focused on an urban environment. The establishment of the urban setting leads to the greater notions of racial divisions within the island. Following the United States occupation of Puerto Rico in 1898, racial tensions grew in the island as many mainland Americans worried of incorporating "inferior races" of Puerto Rico into the American population. This idea that dark-skinned Puerto Ricans' were inferior to lighter Puerto Ricans' is a direct product of Spanish colonization that was further aggravated upon the United States occupation. Therefore, you see a greater neglect in areas, such as urban areas, where Afro-Puerto Ricans make up a large percent of the population. (Zulawski, p. 501)

Closing:

Katherine: After talking about the technical components of the disease and understanding the historical context for its spread, I think that we can find that this theme of neglect still exists with the U.S. Government's relationship with Puerto Rico, what do you all think given Hurricane Maria?

Caroline: I think we can all agree from a microbiological perspective that there were similar disease implications after Hurricane Maria. Following Hurricane Maria, there were outbreaks of other infectious diseases, such as leptospirosis. In the present, we see these problems occurring centuries after the original 1915 study took place.

Will: Hopefully greater prevention methods can be implemented in the future, and the United States can take a far more active role in the support of Puerto Rico in future times of distress.

Lauren: Thanks for listening, and we hope you better understand the historical and microbiological factors that contributed to the epidemic of Dengue fever in Puerto Rico in 1915.

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