Questioning the Zika Virus

Abstract

A growing body of health officials in Brazil are doubting that the Zika “virus” is responsible for the rise in birth defects in parts of that country. Zika, along with yellow fever, has been tossed into the family Flaviviruses; the Latin “flavus” meaning yellow. But unlike yellow fever, the vast majority of Zika’s symptoms for the last 70 years have been mild to non-existent. Despite disseminations by the lay and scientific press, there are serious questions whether Zika causes microcephaly at all. If by March, 2016 the Brazilian Ministry of Health reported 2,197 suspected cases of microcephaly, only 11.48% of these were Zika-positive. Zika is widespread throughout Brazil and South and Central America, yet the bulk of microcephaly cases are confined to the coastal tip of Northeastern Brazil. Furthermore, despite extensive testing, no known mosquito-borne arbovirus or any other virus has to this point been proven to cause Brazilian microcephaly.

While Zika was being portrayed as “the most alarming health crisis to hit Brazil in decades”, tuberculosis and its related mycobacteria were quietly gaining a stranglehold and building an ecologic niche in the very Northeastern region being hit by epidemic microcephaly. Why was this important? With NE Brazilian microcephaly/Zika we are probably dealing with a mosquito-fuelled environmental zoonosis — a disease that can be transmitted from animals to humans — such as primates, and to a lesser extent birds (Mycobacterium avium), and rodents (Mycobacterium microti), all mentioned in the Zika literature. Add to this the penchant of Brazilian’s to illegally capture and keep mycobacterial-laden wild monkeys and exotic birds as pets or for revenue, and you have a potential zoonotic time-bomb ready to explode once the proper vectors presents themselves. Three mosquito vectors have been steadily populating Northeastern Brazil: namely Culex quinquefasciatus, the Aedes aegypti and the Aedes albopictus — all of which have the capacity to transmit viral-like forms of the mycobacteria associated with HIV and through direct laboratory investigation with microcephaly. Perhaps it is time to rethink what’s really behind Brazilian Microcephaly and other symptomatology from the “Zika” agent.

Keywords: The Zika virus; Microcephaly; Aedes aegypti; Flaws in Zika diagnosis; Mycobacterium tuberculosis; BLV; BVDV; Rhesus monkey; Brazil; CWD mycobacteria; Yellow fever; Flavivirus; Systemic lupus erythematosus; Neutralization test

Introduction

Since its conception, the ever-changing saga of the Zika virus has tested the limits of clinical and scientific intellectual credibility. A “virus” isolated on several occasions from the very aggressive day-biter Aedes africanus mosquitoes was “discovered” by Scottish entomologist Alexander John Haddow in 1947, based upon scanty, unconvincing evidence and originally referred to as “a filterable transmissible agent” [1]. Haddow’s methodology to determine whether Zika was Zika rotated around whether it could pass through a fine filter and whether it yielded positive neutralization tests. But actually bacteriologists and not virologists were first to develop and use neutralization tests, for a range of bacteria. And it wasn’t until the development of fractionation...
and plaque techniques in the 1950s that researchers could even fathom the chemical bases of neutralization [2]. And even then virus neutralization remained a contested issue [3]. Dutch science historian Ton van Helvoort aptly and accurately pointed out, that by the 1950s the word "virus" had become so moldable a concept that one could speak of virus workers without the existence of any consensus whatsoever of what viruses were [4].

Haddow joined the Virus Research Institute at Entebbe, Uganda in 1942 (now known as the Uganda Virus Research Institute) as a medical entomologist, primarily a discipline that studies insects. The Institute’s main research focus at the time was on yellow fever. The town of Entebbe, is about 41 kilometers (25 mi) by road south-west of the central business district of Kampala, the capital and largest city of Uganda. Kampala was and still is a known hot-bed for tuberculosis and its close relative Mycobacterium africanum. Africanum, causes up to half of the cases of human tuberculosis (TB) in West Africa. But it was only first described as a distinct sub-species within the Mycobacterium tuberculosis complex (MTBC) by Castets and colleagues in 1968. M. africanum has been cultured from monkeys from West Africa with active TB [5]. And the rhesus monkey, pivotal to both the discovery of the Zika virus and yellow fever virus, is quite sensitive to it and its related mycobacteria.

The similarities between the flu-like symptoms and signs of the Zika Virus and those of viral-like, cell-wall-deficient, variably acid-fast mycobacterial forms which can also be mosquito-borne have already been documented, and include all signs and symptoms attributed to the Zika agent — including cranial calcifications, microcephaly, the Guillain-Barre syndrome, intracranial calcifications and sexual transmission [6]. Furthermore, there are bacterial forms, such as tiny cell-wall-deficient (CWD) mycobacterial forms, from the Mycobacterium tuberculosis complex, including Mycobacterium africanum that could have also passed though the finest filter in Haddow’s possession, and be carried by Aedes and Culex mosquitoes as well. Therefore, at the time of publication, Haddow and team were far more accurate in their one-time use of the words “a filterable transmissible agent” then their leap to that it had to be a virus. Initially there was no indication that Zika even caused human disease [7]. Besides Zika, among the other “viruses” that Haddow and team “discovered” were the Mengo encephalomyelitis virus, the Bunyamwera virus, the Semiliki Forest virus, and the Uganda S virus. Haddow’s Zika mosquito find, Aedes africanus, bites a wide range of animals in addition to human.

Although Human illness caused by Zika virus was first recognized in Nigeria in 1953, it was only confirmed in three ill persons, and for the next 57 years only 13 naturally acquired cases were reported worldwide — always as a mild febrile illness [8-12]. Also, an incredible 80% of Zika infections were and are totally asymptomatic [13]. Then came the Yap episode, the first reported outbreak of Zika fever. Duffy mentioned that in 2007, several islands in the State of Yap, Federated States of Micronesia, purportedly came down with approximately 5,000 infections among the total population of 6,700 [14]. This study was recently again cited by Peterson in his New England Journal of Medicine review [15]. But Yamada and Pobutsky dispute this, finding that the 2007 outbreak in Yap actually only contained forty-nine confirmed cases and 59 probable cases of Zika; mild cases characterized by low-grade-fever, rash arthralgia and conjunctivitis — with no hospitalizations or deaths occurring [16]. Unmentioned, just prior to this outbreak was that in Yap, between 2000 and 2005, there also had been a 33% rise in all types of TB, mostly in women of reproductive age [17].

Beginning as far back as the 1950s, and with the advent of the electron microscope, particles later questionably ascribed to viruses were readily and routinely being detected. Historically, not that long ago—at the end of the 19th century, after 150 years of denial—the medical establishment recognized that there were bacteria, and suddenly every disease seemed to be caused by a bacteria. But with the advent of the electron microscope, unknown disease was more and more attributed to a virus or a retrovirus, often to no avail. Thus it was that some scientists were certain that a virus was behind Lyme disease, mycoplasma pneumonia, and Legionnaires’ disease, before their respective bacteria were found. O’Hara’s Harvard research showed that not only were viral particles “no proof that a virus was involved,” but that they were morphologically indistinguishable in 90% of the enlarged swollen lymph nodes in patients with or without a virus [18]. O’Hara’s study stood out as the one study to that date that used suitable controls. Similarly, African studies of the lymph nodes of patients with HIV also showed them to be indistinguishable from those with just tuberculosis and no AIDS [19,20]. O’Hara concluded, “The presence of such particles does not, by themselves, indicate infection with HIV.” Yet it was the photomicrographs of these same particles that first informed the world that there was an HIV. This habit has persisted to the present despite that in Reproduction of RNA Tumor Viruses, Badar warned that in vitro cultures, even virus free, “can be induced to produce particles which resemble RNA tumor viruses in every physical and chemical respect [21].”

Search without End

In June of 2016, Driggers’ et al. brief NEJM review, entitled Zika Virus Infection with Prolonged Maternal Viremia and Fetal Brain Abnormalities, showed in their panel F of their Figure 4 an inset of “possible viral-like particles” in the stained macrophages in cortical tissue as seen by electron microscopy [22]. In addition, there appeared another electron photo-pictograph in their write-up (Panel C) of a “Flavivirus-like particle”, this time described as a particle “resembling a flavivirus” from the supernatant of SK-N-SH cells inoculated with fetal brain tissue” (Figure 1). SK-N-SH is a neuroblastoma, cancerous cell line that displays epithelial morphology and grows in adherent culture of monolayers on an artificial substrate. In addition, SK-N-SH cells are known to form tumors in immunocompromised mice. The SK-N-SH cell line was established in 1970 from metastatic cells found in the bone marrow aspirate of a four-year-old female of unknown ethnicity [23,24].

Driggers’ “flavivirus-like particle” seems quite similar to what has been referred to as a “C-shaped” viral particle (Figure 1) [22].
By 1974, Miller and Miller, two of the veterinarian-virologists who “discovered” the BLV (Bovine Leukemic Virus), a retrovirus in the form of, again, C-shaped “virus-like particles” in cattle lymphosarcoma — insisted that their C-shaped particles were similar to other C-type viruses “regarded as the cause of leukemia in other species” (Figure 2) [25].

But to Dr. Eleanor Alexander-Jackson, C-shaped ‘virus-like particles’ had nothing to do with viruses at all, — rather they were tubercular mycobacterial L-forms, stainable by special mycobacterial stains, one of which, the ‘triple stain’, Jackson herself had created (Figures 3 and 4) [26].

Bacterial L-forms such as Alexander-Jackson was showing, some of which are “C-shaped” are the connecting link between viruses and bacteria. First described by Emy Klieneberger at England’s Lister Institute, for which she named them “L-forms”, such bacteria were ‘cell-wall deficient’ (CWD) because they either had a disruption in, or a lack of, a rigid bacterial cell wall [27]. This lack of rigidity allows bacteria or mycobacteria the plasticity to assume many forms (pleomorphic), some of them virus-like, but all of them different from their classical parent. Such forms were also poorly demonstrated by ordinary staining, many of them passing through the finest of filters [28]. Of all the bacteria, it is tubercular L-forms (cell-wall-deficient forms) that
predominate and are crucial to the survival of tuberculosis and the mycobacteria. It is mostly in its preferred cell-wall-deficient forms that TB can escape destruction by the body’s immune system [29].

Recently in the journal Infection and Immunity, Randall pointed out that the same SK-N-SH human-derived neuroblastoma cell cultures that Driggers et al. cited in her NEJM Zika article caused M. tuberculosis bacilli to grow to a robust and rapid MOI (multiplicity of infection) of 30:1 bacillus/cell ratio [30]. Quantification of the percentage of SK-N-SH cells associated with bacilli showed a statistically significant increase from 10.2% to 21% over 48 hours. Since Randall’s study there can no longer be any doubt that variably acid-fast bacilli can and do infect neurons directly.

Driggers et al. concluded in their June, 2016 article that “Future studies at various gestational ages will offer better insight into the role of ZIKV [Zika Virus] infection in abnormal brain development and provide markers for its detection” [22]. But just a month before this, on April 30th, 2016, the FDA said much the same thing — i.e., that more time and study was needed. The FDA:

“However, limited information is available currently about the spectrum of defects (such as congenital microcephaly) caused by prenatal Zika virus infection, the degree of relative and absolute risks of adverse outcomes among fetuses whose mothers were infected at different times during pregnancy, and factors that might affect a woman’s risk of adverse pregnancy or birth outcomes (with the Zika)” [31].

For the facts be known, in a historical sense, microcephaly (infants with small heads and brain damage) was only relatively recently suggested to be the result of the Zika. Yet governments, pharmaceutical interests and vaccine makers world-wide still claim with certainty that Zika causes microcephaly, cause abnormally small heads and brain damage. When the Zika agent was first isolated in the Zika Forest (correct and original African spelling was the “Ziika” forest — “Ziika” meaning ‘overcrowded’) from a caged Rhesus monkey numbered 766, “A filterable transmissible agent” was isolated after filtering the serum from this sick monkey. On the strength of this, it was questionably considered a “virus” even before there were DNA/RNA tests available to further show this.

Brazilian Microcephaly in Real Time

Although at least 22 countries or territories in Latin America and the Caribbean, including Mexico and Puerto Rico, have registered homegrown Zika cases, few cases of microcephaly, according to WHO (the World Health Organization) have yet been reported anywhere in the hemisphere but in Northeast Brazil (Figures 5 and 6).

One glaring and persisting question in Brazil then, was why microcephaly was occurring almost exclusively in the Northeast part of the country. Zika, at this point, had infected large swaths of Brazil, yet its microcephalic cases were almost exclusively in a relatively small region of its Northeast (Figures 6 and 7). It is those states in the Northeast, in particular Pernambuco with 14.62
cases per 10,000 births, as well as in Paraiba where microcephaly exists. “The fact is that an increase in cases, for now, is only detected in the northeast of Brazil,” said Jorge Lopez-Camelo, an ECLAMC researcher based in Buenos Aires [32].

Just as importantly — far, far more cases of microcephaly in that Brazilian Northeast tested Zika negative. As of March, 2016, in fact, only 11.48% of microcephaly there tested positive for Zika [Ibid]. Therefore, In Brazil, microcephaly could not be considered as originating from the Zika virus per se. Rather it is obvious that Brazil was dealing with an unidentified Northeastern environmental pathogen, most likely mosquito-borne, which caused the vast majority of cases of microcephaly found there. Furthermore, not only is it epidemiologically highly unlikely that Zika causes microcephaly, but at this point nobody was even completely sure which mosquito/mosquitoes spreads Zika in Brazil. Mosquito species adapted to urban environments in Northeast Brazil include Culex quinquefasciatus, Aedes aegypti and Aedes albopictus (Figure 8). Although the Aedes aegypti mosquito was at first proclaimed to carry Zika, this soon changed to include the Aedes albopictus. But for many the culprit was the much more prevalent Culex quinquefasciatus, which is about twenty times as common as Aedes aegypti in Brazil. All can carry arboviruses, but Culex quinquefasciatus likes to bite both humans and birds and although Aedes albopictus doesn’t prefer birds, it also from time to time bites them along with a host of mammals and vertebrates, including primates and man. Primates were implied as the original source of yellow fever and now Zika as well. Essentially yellow fever is a disease of monkeys living in tropical rain forests. The virus which causes the disease is one of a group of viruses known as arboviruses. Humans are infected by being bitten by rain forest mosquitos carrying the yellow fever virus. This is what makes Culex quinquefasciatus and Aedes albopictus so dangerous to public health. Meanwhile in northeastern Brazil a critical mass of primate/man biting Aedes albopictus was being reached, with some models projecting that Albopictus would eventually cover the entire Brazilian northeast (Figure 9).

Not widely recognized, all of these mosquitoes have one thing in common, they can be vectors for the same “filterable transmissible agents” described by Zika’s discoverers. Yet there is one particular filterable, transmissible agent which is not a virus — and at the same time among the most contagious microbes known to the very same rhesus monkeys used in both the Zika and yellow fever verification trials [33]. Only in West Africa, it was sometimes called Mycobacterium africanum.

Southeastern Australia, 2007

In Australia, it is widely known that Buruli ulcer [BU] is caused by the germ, Mycobacterium ulcerans — a tubercular mycobacterium that was found by Johnson in certain types of southeastern Australian mosquitoes [34]. Mycobacterium ulcerans mainly affects the skin but which can also affect the bone. Although the causative organism belongs to the same family of organisms that cause leprosy and tuberculosis, it is unique because it produces a toxin — mycolactone — which destroys tissue. By 2011, Lavender also in Australia joined Johnson’s quest, adding this:

“The results of this study strengthen the hypothesis that mosquitoes are involved in the transmission of Mycobacterium ulcerans in southeastern Australia. This has implications for the development of intervention strategies to control and prevent BU [Buruli Ulcer]” [35].

But taken together with five other disturbing studies, — these Australian studies had implications far beyond Buruli ulcer with its Mycobacterium ulcerans. It was becoming more and more obvious that flaviviruses weren’t the only thing that mosquitoes had the capacity to transfer back to man. But rather that not only Aedes aegypti and Aedes albopictus, but certain species of Culex (Culex quinquefasciatus included) could also transmit tubercular-like mycobacterial disease [36-40]. Bloodsucking insects such as mosquitoes can potentially be significant vectors for many infectious diseases — and mycobacteria such as Mycobacterium tuberculosis were no exception. Golyshayekskaya described how...
during blood suction after the sting of an *Aedes aegypti* mosquito he saw classic rod-shaped mycobacterial bacilli change into small, ultrafine viral-like coccoid forms—spherical in shape [40]. Such mycobacterial forms have a dense cellular membrane often mistaken for the capsid of a virus. Although they can revert back to the classical tubercular bacilli at any time, their main usefulness inside the propagating mosquito was both the resilience of such tiny cell-wall-deficient coccoid forms while in the mosquito as well as to also make mycobacterial transmission easier through the mosquito while bloodsucking (Figure 10).

To further complicate matters, Silva-Krott and others determined that *M. avium* or fowl tuberculosis also existed in certain bird species, and, in the tropics, there were more than enough “bird biting” mosquito vectors available to transmit and translate this into human disease [41]. But whether *Mycobacterium tuberculosis* or *Mycobacterium avium*, or *Mycobacterium africanum*, once inside the mosquito these microbes became tiny viral-like filterable forms that could pass through the smallest of filters.

**Yellow Fever Virus under Fire**

It was only during a routine surveillance for yellow fever that the “filterable transmissible agent” we now call Zika was stumbled upon in the Zika forest in Uganda by Yellow Fever Research Institute scientists. Recently WHO issued yellow fever warnings as a deadly outbreak of it grows in Africa as well. [42].

The idea that mosquitoes can deliver yellow fever to man is an old one. Patrick Manson, in his tropical medicine text of 1898, referred to yellow fever only as a “germ or virus,” though noting that it probably required an interval of time outside the body to render it infectious [43]. Today’s historical accounts lead us to believe that in 1927 yellow fever “virus” became the first human virus to be isolated [44]. But in reality no virus was isolated. And so it was also in 1927 that Thomas M. Rivers, head of the infectious disease at Rockefeller Research, and often called ‘the father of modern virology’ said this:

“The diseases listed [from River’s Table 1 of filterable viruses] do not form a homogeneous group and some of them should be omitted..... The Rickettsia diseases do not belong here and there is considerable doubt as to how long the other insect-borne diseases [Dengue fever, Rocky Mountain Spotted Fever, yellow fever] will remain on the list [of filterable viruses]. This is particularly true of yellow fever.” - Thomas M. Rivers January, 1927 [45].

Yet “yellow fever” is and was the prototype for all Flaviviruses, including the “Zika”.

And indeed, just as Rivers had predicted, soon Rocky Mountain Spotted Fever (RMSF) would prove not to be a “filterable virus” but rather a potentially fatal rickettsial disease of dogs and humans caused by the intracellular bacterium *Rickettsia rickettsii*. But if there was considerable doubt, according to Rivers, that insect-borne yellow-fever or its accompanying insect-borne flaviviruses were not filterable viruses, then what were they?

When in February of 1882 Carlos Finlay published a paper that first identified mosquitoes as the ultimate source of yellow fever, Finlay was ridiculed, scoffed at, and referred to as the “mosquito man”. Finlay was not the first to run with the idea of a mosquito vector, but he soon became its staunchest advocate. Mere logic should have justified Carlos Finlay’s views from the onset, and 20 dark years of medical confusion could have easily been avoided. What other disease, besides malaria, spread by the *Anopheles* mosquito, skipped eratically from house to house, jumping around corners? A single member of a household might contract yellow fever, while others in the household in close contact might never become ill or if they did, only after a period of about two weeks had elapsed. This was not the course of your typical infectious disease transmission. But an insect intermediary would account for the delay, as when disease develops in a mosquito. Nevertheless for the next two decades Finlay had to patiently and carefully lay out his case — until Walter Reed and the U.S. Army scientists working under Walter Reed finally decided Finlay was right [46].

Finlay also isolated a micrococcus which he felt caused yellow fever. Finlay was far from alone. A hypothesis formulated by Robert Koch said that the yellow fever agent was similar to the cholera bacillus, which Koch discovered in 1883. A prime symptom of the cholera bacillus was black vomiting, also found in end-stage yellow fever. And from the 1890’s onward various bacilli found during the course of yellow fever would compete for the title of yellow fever germ [47]. For decades a long list of skilled bacteriologists, some the best of their day — including names like Sternberg, Sanarelli and then Noguchi — had been searching for the bacteria that caused yellow fever — in spite of the fact that James Carroll in 1901 had dramatized the fact that yellow fever blood passes through a filter without catching any known bacteria.

Late in the summer of 1901, James Carroll returned to Cuba and through further experiments proved that the specific agent of yellow fever was sub-microscopic and too small to be caught in the pores of the diatomaceous filter that supposedly retained
bacteria [48-50]. So to Carrol yellow fever was probably a “virus”. The problem was that Carroll could neither see nor grow it. Carroll had supposedly proved through a series of injections of filtered blood that a filterable agent (a virus) could cause yellow fever. The only flaw in this logic was that a filterable agent did not need to be a virus, as with Noguchi’s bacterial microbe, which had a proven filterable stage [51]. Equating a virus with filterability was sophomoric to begin with. Many viruses are reluctantly filterable. Vaccinia virus often will not pass through a diatomaceous earth or porcelain filter such as was used by Reed’s group and later by Adrian Stokes’ group. The agent of rabies, described by Pasteur as too small to be seen was rarely filterable with methods used up to 1935. Rather the size of a rabies virion was approximately 0.1 to 0.15 μm, the size of many viable particles in bacterial filtrates. Indeed, recently attention has been focused on the fact that bacteria can be smaller in size than viruses and at the lower size limits of life [52].

In yellow fever, other bacterial agents were proposed — most, but not all from credible sources — but all of which were eventually struck down by members of the US Commission on yellow fever. Ironically, after bringing down Giuseppe Sanarelli’s widely supported pleomorphic (many formed) bacillus as causal to yellow fever — in three specific instances, it was Sanarelli’s most ardent detractor, George M. Sternberg, the 18th U.S. Army Surgeon General, who himself was absolutely certain that various bacilli that he had spotted were behind yellow fever. Sternberg explains one of his bacterial finds:

“A microscopical examination of stained smear preparations of the liver or kidney shows that a large number of microorganisms are present. The one which I found most constantly and abundantly in yellow-fever tissues preserved in this way was a large anaerobic bacillus — my bacillus “N”, which I now call Bacillus cadaverinus. Having also found this several times in my smear preparations from fresh liver tissue, and finding it to be very common in the contents of the intestine, I hoped for a time, that it might turn out to be the specific agent in the disease under investigation (yellow fever). But before leaving Havana, I had found what appeared to be the same bacillus in a piece of liver, which I obtained from a case of tuberculosis; and since my return to Baltimore I have found it in other comparative autopsies; so that I now feel compelled to exclude it from consideration as having any etiological relation to yellow fever.” — George M. Sternberg, the 18th U.S. Army Surgeon General and organizer of the Yellow Fever Commission, headed by his subordinate, Major Walter Reed [53].

The Rockefeller Foundation’s International Health Commission resolved to assist with yellow fever and in 1918, a team, headed by Dr. Arthur Kendall, was dispatched to Guayaquil, Ecuador, a residual endemic center, to implement control measures. The team included Hideyo Noguchi. Noguchi, a doctor at the Rockefeller Institute with celebrity status in medical circles, believed that he had found the spirochete, a spiral-shaped bacteria, that spread yellow fever in the Americas. Noguchi could be best described as a research army of one, and under the direction of Simon Flexner, who ran the Rockefeller Institute at the time, he was only used when it counted (Figure 11).

Before Noguchi — within the time frame between 1915-1916, Inada and Ido had correlated Weil Disease (leptospirosis) to Spirochaeta icterohaemorrhagiae. It had an outstanding similarity to yellow fever: jaundice. Even before Noguchi sought to investigate, William Gorgas, a United States Army physician and 22nd Surgeon General of the U.S. Army as well as other specialists believed yellow fever was caused by a spirochete. Noguchi confirmed this in Cuba and South America and proposed a new genus — Leptospira to accommodate both the agent of yellow fever and infectious jaundice (leptospirosis). Finding a cause for yellow fever was important to Gorgas as he had lived through a time when the deadly killer wreaked havoc in the United States (Figure 12).

Noguchi’s most famous contribution was his identification of the causative agent of syphilis (the bacteria Treponema pallidum) Rockefeller’s Dr. Hideyo Noguchi (front and center), newly arrived in Equador to investigate yellow fever.
in brain tissue. And it certainly did not seem far-fetched to Rockefeller physician/clinician Charles A. Elliot that Noguchi came up with a leptospiral spirochete as his putative cause for yellow fever. The classic form of severe leptospirosis is known as Weil's disease, which is characterized by liver damage (causing jaundice), kidney failure, and bleeding—all found in progressive yellow fever. Basically Weil's disease, also from a leptospiro
tas was essentially similar in its findings, albeit usually less severe [54]. During yellow fever epidemics in Ecuador, Mexico and Peru from 1918 to 1920, Noguchi isolated strains of a cultivable spirochete from human victims [55]. In Ecuador as elsewhere, Noguchi only did so when his Ecuadorean collaborators were able to show Noguchi indisputable cases of yellow fever. With the blood of patients who were in the early stages of the disease, Noguchi infected guinea pigs. These fell ill, showing symptoms which resembled those of men suffering from yellow fever. The blood of the first group of guinea pigs was used to inoculate another group, in which the same manifestations of disease duly appeared. Dogs and monkeys proved to be susceptible in a similar way. Attempts to transfer the infection from one animal to another by means of *Aedes Aegypti* mosquitoes were successful. Finally Noguchi was able to cultivate from the blood a minute, delicate, thread-like, spiral organism—to which he gave the name *Leptospira icteroides*, "slim spiral, the jaundice maker." Noguchi did not assert that he had discovered the inciting germ of yellow fever, and was careful to state that he wished to test his results at Guayaquil, Equador by further investigations in other places, especially in Merida, Yucatan. Furthermore, his discovery of the slim, spiral jaundice-maker enabled him to prepare a serum.

Hideyo Noguchi already had distinguished himself by the discovery of spirochetes in brain tissue of syphilitics. And although Noguchi was aware of another spirochete, *Leptospira icterohaemorrhagiae*, as the cause of Weil's disease—there was speculation that Weil's disease and yellow fever might be identical or closely related diseases. So Noguchi sought spirochetes in Ecuador. He found some in the livers of yellow fever patients and was able to pass them easily to guinea pigs. He felt he had discovered the causative agent of yellow fever—at least in the Americas, and strongly implied this in several publications [56,57]. Noguchi was roundly criticized by those who felt that he was mistaking yellow fever for Weil's disease. But when Hideyo Noguchi got wind of this, he decided to take matters into his own hands and run his own African studies.

There soon came a point where regarding yellow fever the lines were drawn. It was either a virus or a bacterial leptospiro
tas. And who better was there then Noguchi to rebut the UK's Adrian Stokes posthumous paper that it was a virus (unfortunately Stokes would die of yellow fever before Noguchi even arrived in Africa) [58]. Stokes, by his own team members admission was a "zealot" of the missionary-type for the filterable virus theory of yellow fever. But Stokes had done no more or no less than establish that Rhesus monkeys were susceptible to the yellow fever agent and that the serum of infected monkeys, filtered through V and N grades of Seitz "bacterial" asbestos filters, produced fatal infections of yellow fever. Noguchi, on the other hand, had already established that his spiral bacterial microbe had a filterable stage, as later confirmed by Kendall [51]. Once in Africa, and having visualized yellow fever specimens, Noguchi did see a bacterial organism, but, by his own admission, it wasn't a Leptospira.

Adrian Stokes maintained that he never saw Noguchi's Leptospira or any other causitive bacteria in yellow fever, but, as a sidenote, *Leptospira* (as well as other bacteria/mycobacteria) did not always have the classic morphology that Stokes was looking for, but could not find. In the case of Leptospira, Stokes looked solely for a spiral form. Yet it is only necessary to transfer a pure culture of Leptospiro to any non-ideal medium to find short straight rods and coccoid forms growing well without characteristic morphology [59]. Nobel nominee Lida Mattman's research in fact went so far as to point towards the fact that all bacteria produce a viable filterable stage. Small granular forms of *Leptospira icterohemorrhagiae* are common and important in *vivo*. And today's fluorescent antibody tests detect almost twice as many infections as the dark-field or staining techniques used by Stokes to rule out Noguchi's *Leptospiro* in yellow fever. Also, importantly, Inada et al. already showed in 1916 that when you produced a filtrate of blood or organs infected with *Leptospira icterohaemorrhagiae*, although this produced the disease, Leptospiral spirochetes per se were never seen in the filtrate [60]. Stokes would very soon die of yellow fever but just before he did he had this telling exchange on his deathbed with colleague EJ Scannell, who had seen Noguchi isolate his bacteria time and again from Ecuadorian yellow fever, and believed that a bacteria and not some vague 'filterable virus' was behind yellow fever. Scannell had been with Stokes' team for approximately two weeks. Stokes was mortally ill.

"Well?" said Stokes.

"I think you have it." Scannell said, referring to that he thought Stokes had yellow fever.

Stokes, though in the last stage of his disease, needed to clarify to Scannell that he had not recently been handling Noguchi's leptospiro.

"Yes", answered Scannell. He knew.

"Have I been working with a virus?" pressed the dying Stokes.

"That's what you fellows call it." Answered Scannell, without emotion.

Stokes, perturbed, pressed on. "Are you ready now to agree, to admit that yellow fever is caused by a virus and not by leptospira?"

Scannell, pitying the dying man, weighed his words carefully: "I believe you fellows are right. I don't have the explanation, but I think you have yellow fever and got infected in the laboratory by what you call a virus" [61].

The discovery that the West Africa team had found a "filterable virus" passing through monkeys was met with controversy—particularly from Noguchi. And so, two months after Stokes's death, in November of 1927, Hideyo Noguchi arrived in Accra, West Africa to begin by examining not only samples from the
very blood that Stokes had worked to ‘prove’ his viral etiology but with Stokes own blood.

In cables to New York, Noguchi informed his colleagues at Rockefeller that his findings were going to shake the very foundation of the theory of yellow fever’s cause, and his boss Simon Flexner, had little doubt that questioning yellow fever as a ‘filterable virus’ would be high on his list.

In a letter to Flexner, Noguchi said “I have been getting a definite organism (not a leptospira, but often forms spirals) which reproduces alterations very similar to experimental yellow fever (…) The organism is filterable” [62].

Other communications soon followed:

Extracts from letter of Hideyo Noguchi, Accra, March 9th, 1928 to Dr. Simon Flexner:

“I have obtained a visible organism from practically all strains (human and experimental) which produces similar infection as the passenger virus. At a certain stage of development the organism assumes a spiral form and is extraordinarily motile.”

“Whether or not this organism is a secondary invader or causative agent is yet to be determined”[63].

Received in NYC, NY Western Union Cablegram to Dr. Simon Flexner March 16th, 1918

4/HN45C LCO RUS 50.

“This organism has a spirochaetal phase but is entirely distinct from Leptospira in morphological and cultural properties. It is readily isolated from infective mosquitoes” [64].

NOGUCHI TO RUSSELL OF ROCKEFELLER INSTITUTE (Letter) ACCRA MARCH 25, 1928

“In my previous letter I have told you that I have cultivated a peculiar organism from all human and animal yellow fever materials, and also from infected mosquitoes. This organism is pathogenic for rhesus monkeys and to some extent other monkeys. The lesions produced are just the same as those produced by passage virus. It is filterable”[65].

Noguchi also wires his wife “I have found the germ,” following this up with a letter saying “I am absolutely sure. This germ is so ordinary that most previous investigators have thrown it away as nothing of importance…………….”[66].

Noguchi was set to return to New York, but first needed to check the work of the deceased Stokes and the Yellow Fever Commission near Lagos, West Africa. He would never make it to Lagos however and having boarded a boat he was soon rushed back to Accra where he too died of yellow fever. If he had discovered the bacterial cause of yellow fever, which was likely, he would now take its secret to his grave. And the only other scientist to have worked close enough with Noguchi to know what germ Noguchi was closing in on — Scottish surgeon/ pathologist/bacteriologist William Alexander Young, would die of the same yellow fever seven days after Noguchi. As for the events following both of these men’s tragic death, the creation of a yellow fever vaccine meant anything but the establishment of that disease’s true etiology.

Noguchi always kept his findings close to his vest. So characteristically, what he said in his communications were major hints only, without pin-pointing actual cause. Obviously he had spotted a pleomorphic organism in yellow fever, filterable at certain stages and at certain points in its evolution capable of spiral forms. Also, although it had a spiral phase it was not a Leptospira. This was entirely possible, as even Mycobacterium microti from rodents has a spiral phase. Noguchi’s organism formed spores, possibly placing it in the category of a bacillus. Its spores could withstand punishing temperature extremes and it was pathogenic to rhesus monkies. It could be and was carried by Aedes mosquitoes. It was motile. And lastly it appeared to have the ability as per Stokes, Noguchi’s and Young’s untimely deaths, to penetrate intact skin. We might never know more.

Brazilian Microcephaly —A Prime Candidate

Viral encephalopathies retain the capacity to simply be passengers in an active and ongoing bacterial/ mycobacterial infection, or be mistaken for cell-wall-deficient forms of these. In many ways, scientific confusion regarding the Zika-microcephaly link parallels the AIDS crisis in the 1980s in the following manner: before the AIDS virus as we now know it was settled upon, the Barr-Epstein, the Cytomegalovirus (CMV), and the HTLV-1 viruses were all accused as being the culprit behind AIDS and all turned out to be false leads. Volumes were written on the erroneous HTLV-1 virus as the cause of AIDS. And the CMV virus, a known cause of microcephaly, at the end of the day, along with the Barr-Epstein virus, both in the case of AIDS, were soon merely considered non-causal viruses that just happened to be picked up in diagnostic testing.

Yet microcephaly still occurs in AIDS and what quickly became obvious to scientists was that nontuberculous mycobacterial (NTM) infection such as Mycobacterium avium and Mycobacterium fortuitum were and still remain one of the most important causes of opportunistic infection in AIDS. Along with this Mycobacterial infection is also the leading cause of infectious death in AIDS. Jacob and Henein, writing about Central Nervous System (CNS) involvement with nontuberculous mycobacteria and in particular Mycobacterium avium concluded that Avium should be considered as a serious pathogen in any patient with AIDS [67]. And although other AIDS-related opportunistic infections can cause CNS involvement, Bishburg found that TB and Avium preceded these infections by from one to 10 months [68].

In Brazil, when fever of undetermined origin (FUO) was studied in fifty-five AIDS patients, far and away that fever was caused by Mycobacterium tuberculosis or Mycobacterium avium [69]. In fact tubercular mycobacterial infections represented 56.1% of all FUO’s of infectious diseases found in these AIDS patients. Zika, which can in of itself present with an FUO, was not found present in the Brazilian study.

Although today the cause of microcephaly in most babies is
unknown, early medical references to microcephaly just prior to the 20th century, such as that written up by Alexis Thomson MD, leave little doubt that most victims born with microcephaly died early from tuberculosis [70]. And although the 1952 pilot study that put the Zika Virus on the map failed to give testimony to any congenital or microcephalic findings in mice under actual experimental studies — five years later, in 1957, Gluecksohn-Waelsch certainly reported that experimentally, when brain emulsions with tuberculosis (Complete Freund’s adjuvant or CFA) were injected into female mice beginning prior to conception — abnormalities were observed in the nervous system of 8% to 9% of the embryos born to these mice—including microcephaly [71].

Microcephaly is associated with numerous genetic etiologies, including chromosomal and metabolic disorders and also non-genetic causes. It is poorly appreciated that Warthin, Rao, Lakimenko, and Golubchick all revealed how tuberculosis itself could cause chromosomal change that can lead to birth defects like microcephaly [72-75]. Warthin showed tuberculosis’s early penetration right into the corpus luteum itself, where abnormal meiotic chromosomal splitting can occur. Similarly Rao found that the tubercle bacillus itself is capable of inducing chromosomal changes that can result in nondisjunction of the human egg. Lakimenko and Golubchick independently proved just how devastating TB could be to the chromosomal apparatus of cell cultures of the human amnion. In not one, but two independent studies — an increase in pathological mitoses was shown, as well as arrest of cell division in metaphase, and the actual appearance of chromosomal adhesions absent in control cultures. Indeed, Lakimenko and Golubchick demonstrated that early tubercular involvement was not only destructive against chromosomes but the very spindles that separated them. It is also known that total ovarian destruction occurs in 3 percent of women with pelvic tuberculosis, again the site where chromosomal abnormalities usually occur [76].

The Exotic Birds and Monkeys of Northeast Brazil: A Ticking Time Bomb

“On a recent visit to one property in the run-down neighborhood of Vasco da Gama, the scale of the challenge soon became clear. The health workers stared at a wall lined with dozens of caged songbirds, each with its own water bowl.” — Bruce Douglas in Northeastern Recife, Brazil. The Guardian. Monday 25 January 2016.

Primates, are the best-documented Zika virus reservoirs, with transmission to humans primarily by mosquito vectors (Aedes spp., including Ae. aegypti and Ae. Albopictus). A recent Brazilian study showed that 29% of the Northeastern primates (marmosets and capuchin-monkeys) in Ceará State were positive for Zika by Real-Time PCR [77]. Furthermore cases of microcephaly in Ceará occurred in municipalities where viremic monkeys were sampled. The capuchin-monkeys were pets except for one. The study suggested that such primates could possibly act as reservoirs, similar to the sylvatic cycle of yellow fever in Brazil. The common marmoset (Callithrix jacchus) is a New World monkey, which originally lived on the Northeastern coast of Brazil — in the states of Piauí, Paraíba, Ceará, Rio Grande do Norte, Pernambuco, Alagoas and Bahia [78].

Marmosets are captured and traded as pets. Though popular as pets, they become difficult to control as they get older and are thus abandoned or killed [79]. Capuchin monkeys have also become popular pets and attractions for street entertainment, and are hunted for meat by local people [80]. In both captive and free-ranging nonhuman primates (NHP), TB caused by M. tuberculosis, M. bovis and M. africanum has been reported for over a century [81,82]. And it is likely that nonhuman primate infection with TB has been underreported [83]. In 1970-71, the CDC estimated that tubercular infection in individuals in contact with these and other non-human primates was 60 to 100 times that of the population at large. Unlike humans, monkeys have no natural resistance to the disease. When they do catch it from a human, it usually spreads very quickly and fatally (as in acute miliary tuberculosis) and to areas other than their lungs. During their illness, they can spread the disease to anyone who comes into contact with them or their waste [84].

Another possible reservoir for Zika, based on serology, but not verified by viral isolation, may be certain species of birds that support Zika infection, including forest-dwelling birds, waterfowl such as ducks, horses, goats, cattle, and bats [85]. In Uganda, a sample of 221 birds showed 15% had been exposed to Zika and to some in Brazil it seemed that in the Northeast, a critical mass of a growing impoverished population, a growing bird-biting mosquito population, and a huge bird population — often captive in cages — was about to explode [86].

Brazil’s Northeast Region might only represent 18% of Brazilian territory, but with a population of 53.6 million people, it contains 28% of the total population of that country. Nearly three-quarters of the population live in urban areas clustered along the Atlantic coast and about 15 million people live in the hinterland. It is an impoverished region: 58% of the population lives in poverty, defined as less than two dollars/day [87]. Each of the states’ capitals in Northeastern Brazil are also its largest cities, and they include Recife, Salvador, Fortaleza and São Luís, all lying on the Atlantic coast, each with a population above a million inhabitants [88]. Brazil is a country of many birds with 1,832 species [89]. Such numbers incredibly represent approximately 57% of the total species of birds recorded in South America [90]. In Northeast Brazil birds and fowl are everywhere.

Moreover, there is a widespread practice in Northeastern Brazil which is both common and from the standpoint of public health, quite dangerous. It is the practice of capturing wild birds and keeping them in cages, both in urban and rural areas [91,92]. Caged birds can also be found everywhere, captured mostly from the natural environment illegally. Many of these birds serve as pets, a common practice. It is almost as if it is culturally intertwined with the people and so important to them that you will even see cages with fake birds [93]. In the Northeast, the Caatinga predominates in the semi-arid region of Brazil, and is one of the semi-arid biomes with the greatest biological diversity in the world, where a multitude of birds exist, among them the families Emberizidae, Columbidae, Icteridae and Psittacidae (Figure 13).
In this semi-arid Northeast region of Brazil, birds are utilized for different purposes and are of great social, economic and cultural importance. In the Caatinga of Northeast Brazil alone, there are 511 species of birds, some of which, including their eggs are often utilized by the local people as food, or medicinal remedies, or ornamental items, besides being also used for pleasure, companionship — as pets [94,95]. In short, it is very common in the region to rear birds in cages in Northeastern Brazil and Avian mycobacteriosis from *Mycobacterium avium* is generally just such a disease of captive bird populations. Avian tuberculosis is an important disease which affects companion, captive exotic, wild, and domestic bird [96]. If in the past most cases were felt to have been caused by *Mycobacterium avium* and *M. intracellulare*, more recently, the atypical *Mycobacterium genavense* has emerged as another significant cause of the disease. And it is the potential for avian mycobacteriosis to spread to humans that makes this subject so important, especially when one considers that *Mycobacterium avium* is a frequent traveler with AIDS, and that AIDS or associated bacteria are a known cause of microcephaly.

**A Passenger Virus?**

Of the 104,500 estimated incident TB cases occurring in the other countries of South America in 2010, 81% (85,000) occurred in Brazil, especially its northeast — in a country that currently ranks 1st in the Americas and 17th worldwide by estimated numbers of incident TB cases. In addition to this three major endemic countries (India, Brazil and Indonesia) account for 81% of all new cases of closely related leprosy from *Mycobacterium leprae*. Brazil accounts for almost one third of all incident TB cases in the Region. In South America, Brazil’s nearest competitor for cases of tuberculosis is Argentina, with only 11,000 cases or approximately 11% of all South American cases [Figure 14] [97].

This finding needs to be considered in line with the fact that young children develop disease from *M. tuberculosis* more frequently after exposure than older children and adults (73% versus 25%), and the fact that infants younger than 12 months develop meningeal and disseminated disease from *M. tuberculosis* considerably more frequently than older children and adults (20% versus less than 1%) [98].

Zika is characterized as being from the flavivirus family, a group of viruses that cause yellow fever, Nile fever and dengue fever. Some of these viruses can occasionally cause an encephalitis — or inflammation of the brain, and be life threatening. The only problem is, according to Melo’s 2016 account, that among the flavviruses, which Zika is, true tissue brain pathology and insults are traditionally practically unheard of with the exception of isolated reports linking West Nile Encephalitis to a few cases [99]. Melo concluded that “until more cases are diagnosed and histopathological proof obtained, the possibility of other causes besides Zika cannot be ruled out”. And to all but the tunnel- visioned, such possibilities included more than just viruses. The list of physical conditions being attributed to Zika continues to increase. In still another coronation, it was purported to cause fever with encephalopathy — otherwise known as “febrile encephalopathy.” Yet a study by Anga and colleagues dealing with the cause, clinical presentations and outcome of children with febrile encephalopathy in Papua New Guinea published in a 2010 issue of the Annals of Tropical Pediatrics puts that finding in perspective [100].

Papua New Guinea [PNG] is not exactly a stranger to the Zika Virus, and the CDC, after retrospective testing for Zika virus samples there, taken from patients presenting with a febrile illness between July 2014 and March 2016, revealed local transmission of the virus, according to a World Health Organization (WHO) report. The CDC (Centers for Disease Control and Prevention) then placed Papua on a Zika Alert — Level 2, mandating “Practice Enhanced Precautions” — particularly in those parts of Papua New Guinea below 6,500 feet — which most of the country is [101]. The mosquitoes that spread Zika usually do not live at elevations above 6,500 feet (2,000 meters) because of environmental conditions. Therefore travelers whose itineraries were limited to areas above this elevation on Papua were told that they were at minimal risk of getting Zika from a mosquito.

But on March 21, 2016, Papua’s Health Department itself told a much different account, contradicting the WHO report. According to this agency, there was no Zika virus outbreak on Papua though there were some confirmed cases of Zika virus [102]. Their Health Department’s ultimate conclusion: that although Zika had been present in PNG since at least May 2015, it presented generally as a mild illness.

**A More Virulent problem**

As it turns out, at that moment, Papua, similar to the State of Yap in the Federated States of Micronesia, as of March, 2016, had a much more significant and virulent problem then Zika — it had a deadly tuberculous Pandemic [Figure 15] [103]. Papua’s national health authorities were calling it a “national emergency.” “With approximately 30,000 people in the country newly infected with the “TB bacteria” every year, increasing incidences of drug-resistant strains, and limited access to adequate healthcare, the nation has seen a recent resurgence of support from international governments and medical humanitarian agencies.” And with one of the highest infection rates in the world, drug-resistant strains of tuberculosis were drawing further attentions to this crisis on Papua like at no time before.

**Febrile Encephalopathy on Papua**

Zika has only relatively recently been proclaimed as a possible cause of febrile encephalopathy.

By the summer of 2010, Anga, appearing in the *Annals of Tropical Paediatrics*, sought to document the cause, clinical presentation and outcome of cases of febrile encephalopathy on Papua New Guinea [100]. In the study children aged between 1 month and 12 years presenting at the Port Moresby General Hospital in Papua with febrile encephalopathy were studied prospectively. Although out of 149 children studied, a definite pathogen behind
the febrile encephalopathies was only identified in 37% of cases — the distribution was revealing. Thirty-three had bacterial meningitis whereas 5 had tuberculous meningitis and 18 had probable tuberculosis meningitis (adding up to a total of 23 with probable or certain TB meningitis). There were 10 with malaria and 5 with flavivirus encephalitis. One had rubella and one had HIV encephalopathy. Anga’s study specifically mentioned that although flavivirus, including Japanese encephalitis are a cause of the febrile encephalopathy syndrome, so is *Mycobacterium tuberculosis* and obviously to a far greater extent. Almost 42% of all diagnosed cases were either from TB or probable TB. Also, although pyogenic bacteria indeed claimed an even higher rate of cases of febrile encephalopathy, the question was how many of those pyogenic bacterial encephalopathies were in play as secondary infections for an underlying tubercular involvement — a phenomena documented by and since the time of Koch [104]. From the onset, Koch concluded that other microorganisms, especially the pyogenic bacteria, secondarily infected and thus shared in the destructive work of the tubercle bacilli.

**What types of Testing for Zika Virus are Available to Test Pregnant Women?**

The current recommendations for Zika diagnostic practices are based on the understanding that Zika viremia usually lasts for less than a week after the onset of infection [105]. During this week of symptomatic infection, RNA detection in serum or blood is considered to be the diagnostic method of choice although Zika RNA can be detected in urine for some days longer [106,107]. Zika is also present in semen for an unknown length of time, and scattered reports of sexual transmission of Zika have emerged [108-112]. But by and large RNA testing is not recommended for pregnant women after the first week from the onset of clinical disease. The diagnosis is usually based on a Zika-specific antibody response with higher IgM and neutralizing-antibody responses to Zika than to other flaviviruses [113]. The first week criteria for using RNA testing is not set in stone however, and Zika RNA has been found in the serum of a pregnant woman at 4 weeks and 10 weeks after the clinical onset of Zika infection but not after delivery.

In addition to current Zika antibody IgM diagnostics, the use of quantitative RT-PCR methods is now thought to be a potential diagnostic approach for ongoing placental or fetal infections in
pregnant women.

But Kary Mullis the inventor of that PCR, and as a result a Nobel Laureate, has been very clear regarding that PCR’s valid use. Mullis said that such tests cannot detect free, infectious viruses at all; they can only detect proteins that researchers believe, in some cases wrongly, are unique to the virus being tested for [114].

Real Time RT-PCR has and is also being used to detect and analyze cell-wall-deficient and classical tuberculosis, but this time with Mullis’s approval as a valid use of RT-PCR [115].

A Manufactured Consensus?

In mid-May, 2016, the Vaccination Reaction reported:

“Now, think of Zika. Before this year, very few people had ever even heard of the Zika virus. Now, practically everyone in the world knows about Zika and believes that the primary cause of babies being born with shrunken heads (microcephaly) and brain damage in Brazil is that their mothers were bitten by the Zika-carrying mosquito while they were pregnant. Why does everyone believe that? Because public health officials at the U.S. Centers for Disease Control and Prevention (CDC) and National Institutes of Health (NIH) say so. Forget that these federal health agencies have provided no solid scientific evidence of a causal relationship. That’s beside the point. It’s the CDC and NIH” [116].

Yet the accuracy of what the CDC from time to time espouses is rightfully questioned. On its website for Physicians, the CDC first lists the Zika Virus’s signs and symptoms as:

“Characteristic clinical findings are acute onset of fever with maculopapular rash, arthralgia, or conjunctivitis. Other commonly reported symptoms include myalgia and headache. Clinical illness is usually mild with symptoms lasting for several days to a week. Severe disease requiring hospitalization is uncommon and case fatality is low. However, there have been cases of Guillain-Barre syndrome reported in patients following suspected Zika virus infection. Recently, CDC concluded that Zika virus infection during pregnancy is a cause of microcephaly and other severe fetal brain defects”[117].

CDC then said this:

“Based on the typical clinical features, the differential diagnosis for Zika virus infection is broad. In addition to dengue, other considerations include leptospirosis, malaria, rickettsia, group A streptococcus, rubella, measles, and parvovirus, enterovirus, adenovirus, and alphavirus infections (e.g., Chikungunya, Mayaro, Ross River, Barmah Forest, O’nyong-nyong, and Sindbis viruses)” [118].

“Broad?” Perhaps. But not nearly broad enough, despite the mention of half a dozen esoteric and little known viruses, a few bacteria, and the purposeful exclusion of the rule-out of not only a major disease in the differential of Zika — but the most frequent cause of Fever of Unknown Origin (FUO) — which (although it has been attributed to Zika, from time to time) is extra-pulmonary tuberculosis [119].

It is a poorly kept secret that currently, assays to Zika cross-react not only with certain flaviviruses as has been commonly communicated to us, but with Systemic Lupus Erythematosus (SLE). But most current Zika diagnostics fail to test for SLE. This is despite the fact that the radiologic characteristics of Systemic Lupus Erythematosus (SLE) overlap considerably with those of the intrauterine “Zika Congenital Syndrome” and that Hydroxychloroquine, now used to treat SLE cerebritis, is being contemplated for treating pregnant women suffering from acute Zika [120].

Then why is Systemic Lupus Erythematosus being left out as a possible cross-reactant in Zika testing panels?

Schlossberg mentions the cross-reaction of Zika and SLE, at the same time placing mycobacterial disease in the differential rule-out for aseptic encephalomeningitis along with viruses such as Zika that purportedly affect the CNS [121]. Furthermore, by 1982, Cantwell, Kelso and Jones were speculating from their findings that variably acid-fast cell-wall-deficient microbes “might be the long sought-after etiologic agents in the production of” cutaneous and systemic lupus erythematosus (SLE) [122]. Perhaps Cantwell and his group were right. Studies since indicate the possible involvement of mycobacterial intracellular 70 kDa HSP (Heat shock Protein) in SLE, with the mycobacterial Heat shock protein acting as a trigger for autoantibody production [123]. Also Patients with TB are found to have positivity for rheumatoid factor and antinuclear antibodies, the latter of which are characteristically seen and a part of the diagnostic apparatus for Lupus. With growing evidence in the form of increased prevalence of antecedent TB noted in various studies, and the evidence from experimental autoimmune arthritis along with the demonstration of various antibodies in TB patients, and the cross-reactivity of the monoclonal antibodies against MTB to various components of DNA, it could easily be postulated that MTB can act as an immunomodulatory agent to precipitate SLE, especially in endemic areas [124-126].

Schlossberg goes on to mention that it is because the Elisa used to detect Zika can cross-react with not only with other Flaviviruses but systemic Lupus, that it should be viewed as a screening test only and initial serological positive samples should be confirmed by neutralization tests [121].

In putting together its RT-PCR Zika Test, Quest Labs Focus Diagnostics left out both SLE and tubercular or other mycobacteria as possible cross-reactants — maintaining all the while that its RT-PCR probes “against other common causes of acute febrile illness in humans.” [127] Yet it then goes on, following the FDA’s lead, leaving out the necessity to test for any cross-reactivity data for the mycobacteria, a remarkable cause of “febrile illness in humans”, as well as omitting such assays for systemic Lupus.

Conclusion

In the 1950s, Brazil eradicated the A. aegypti mosquito. The government sent inspectors door-to-door looking for mosquito-breeding containers and spraying DDT. In fact Brazilian authorities made such a ferocious assault on Aedes aegypti — one of the
mosquitoes that spreads the Zika virus — that it was eradicated from Latin America's largest country by 1958. The same thing happened in post-World War II Guam when American forces began its DDT program, instituted on the island in the 1940s. Insect-related diseases, huge on Guam before the use of massive amounts of DDT by air starting in August 1944, sunk dramatically. This aerial DDT campaign single-handedly all but wiped out an entire mosquito species—the same dangerous Aedes aegypti—to the point that only a single specimen of the A. Aegypti mosquito was recovered on Guam in a 1950 survey. It also decimated Culex species of mosquitoes. Aedes aegypti on Guam would not even begin to recover again until the 1970s [128]. Had either of these lessons been learned and still practiced, there probably would be no need for the present discussion altogether.

There is no cure for the flavivirus Zika. And there is no cure for the yellow fever “virus”. And the personal egos of the scientists involved historically in finding or berating each potential yellow fever pathogen as it was uncovered was a beauty to behold. Hideyo Noguchi uncovered a spiral germ in yellow fever in the Americas on July 9th, 1918. But by the time he met Aristides Agramonte of Havana, and other members of the Walter Reed (Walter Reed, James Carroll) Commission on yellow fever, trouble was in the air. And most of it was coming from the Commission itself:

Noguchi reported back to his chief, Simon Flexner, head of Rockefeller research on the occasion saying:

“On the whole, his [Agramonte’s] objections were very unreasonable.” “….I am not certain whether these Havana men are really interested in scientific discussion [of North American yellow fever] or not” — Noguchi to Flexner Aug. 11, 1924, Rockefeller Archive Center [129].

They weren’t.

The Yellow fever commission, consisting of Reed, Carrol, Agramonte and Lazear had already demonstrated, in their own eyes, that yellow fever was due to a ‘filterable virus’ and would hear no part of Noguchi’s suggestion that it wasn’t. Similar resistance greeted him in his journey to Accra, West Africa. It has yet to be proven that Noguchi’s African findings were wrong, but his detractors’ assessments of his work there were and still are simply conjecture.

On February 10, 2016, once again, the New England Journal of Medicine published another Zika study this one done in Slovenia based on a single solitary case, entitled Zika Virus Associated with Microcephaly [130]. Obviously “associated with” did not mean that the Zika was causative for microcephaly. The authors admitted that “Our discussion includes details of fetal imaging and pathological and virologic analyses [only]”. And that was about the only “analyses” they did. An accompanying Editorial in the same issue weighed in that “The findings of this case report do not provide absolute proof that Zika virus causes microcephaly” although... “the evidence in this case report makes the link stronger” [131]. But, making the link “stronger” is still far from providing “absolute proof” that the Zika causes microcephaly. The NEJM paper used RT-PCR with “Zika-specific primers” as well as deep sequencing (IonTorrent), which itself includes a RT-PCR step. Also, because deep sequencing works by assembling fragments, we don’t actually know that there was a complete Zika genome anywhere in the tissue—just that there was a representative collection of fragments attempting to cover the complete genome. Furthermore the EM (Electron Microscope) pictograph suggests the particles of a viral infection, but doesn’t independently identify the virus. So we have three different techniques whose flaws don’t quite cover for each other.

One virologist even admitted: “I don’t think we know enough to say that presence of a virus in the fetus is automatically a bad thing. We do have a virome and the fetus acquires it from the amniotic fluid. It’s mostly phages but there are likely to be animal viruses there as well.” But just where do “phages” come from? They do not come from viruses — they come from virulent bacteria and mycobacteria.

In this paper we have reviewed flaws in the methodology first used to detect the Zika and yellow fever “viruses”. We have also presented the views of experts in the field that regarding the Zika, until more cases are diagnosed and further histologic proof and scientific evidence are established, the possibility of “other causes” cannot be ruled out. At the same time we have presented what a prime candidate for such “another cause” might look like— the Mycobacterium tuberculosis complex, and its related often zoonotic forms—an infectious agent with transmissible, filterable, viral-like forms; an infectious agent that can be transmitted by the very same Aedes and culex mosquitoes which carry Zika; and a known neurotrophic agent that already has infected at least one-third of the people in the world and is extremely prevalent in Brazil. An agent that that can cause microcephaly, disrupt brain growth, instigate fever of unknown origin, be sexually transmissible, create joint pains and rashes, cross the placenta in its preferred, tiny, cell-wall-deficient forms, instigate the Guillain-Barré syndrome, and create cranial calcifications. And all of these are not by recent supposition or conjecture—but by decades of peer-reviewed fact. The only reason why the BCG vaccine (watered down cow tuberculosis) is given to all Brazilian children during the neonatal period is to protect the soon to be infant and then toddler against miliary, blood born, and the cerebral forms of tuberculosis. Yet, in general, such administration of the BCG vaccine to pregnant women is forbidden by the Royal Children’s Hospital in Melbourne to pregnant women in general, no less neonates that have contracted TB, even latent TB—which often goes undetected. The same rhesus monkeys that were so successfully used in both the original Zika and yellow fever trials, and were noted by Noguchi to be extremely vulnerable to his bacterial find, are remarkably susceptible to tuberculosis.

And although the 1952 pilot study that put the Zika Virus on the map failed to give testimony to any congenital or microcephalic findings in mice — five years later, in 1957, Gluecksohn-Waelsch certainly reported that experimentally, when brain emulsions with tuberculosis (Complete Freund’s adjuvant or CFA) were injected into female mice beginning prior to conception— abnormalities were observed in the nervous system of 8% to 9% of the embryos born to these mice—including microcephaly [71].
In addition, although *Aedes albopictus* is frequent found in the South-eastern and southern states of Brazil, it is also in coastal Northeastern Brazil and predicted to increase in strength (Figure 16). Since it can bite among other things, birds and man; and *Mycobacterium avium* is prevalent in the birds of Brazil as elsewhere, there exists the possibility of an Aedes vector transmitting *Avium*. Golyshevskaya found that mosquitoes of the genus *Aedes* could transmit viral-like mycobacterial cell-wall-deficient, acid-fast forms to humans [40].

The World Health Organization (WHO) and the Pan American Health Organization agree that “There is no specific antiviral treatment for Zika virus. Symptomatic treatment after excluding more severe conditions such as malaria, dengue, and bacterial infection is recommended” [132]. However, present Zika diagnostics persist in leaving out a group of zoonotic diseases, along with Lupus, which could possibly cross-react, causing a false positive Zika test. This along with the refusal to include such mycobacterial disease in their differential diagnosis — which can simulate Zika in every way — benefits no one. Virulent infections responsible for epidemics/pandemics/deformities are never “wished” away.
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Check out the ranking of the largest metropolitan areas, Brasil, 2010.

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