

## **The History of the Only Rabies Epidemic in Trinidad and Tobago (1923-1937)**

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### **Introduction**

This paper reviews historically the only rabies epidemic in Trinidad which occurred between 1923 and 1937, and the ensuing epidemiological investigation that led to new knowledge of the disease. It chronicles the events that led to crucial experiments, which provided evidence for the first time, that bats were capable of transmitting rabies. The epidemic began among cattle in 1923 and progressed without being recognised as rabies, with many alternative diagnoses offered. The epidemic mysteriously and suddenly jumps the species barrier to spread to humans, which accounted for 84 deaths between 1929 and 1937. The disease in cattle and man was not recognised as the same until 1931. Once it became clear that the disease was rabies and the bat the agent for transmitting the disease, public health measures were implemented to arrest the epidemic.

### **History of Outbreak**

The history of the outbreak of paralytic rabies in Trinidad, transmitted by bats to humans and lower animals forms in 1925, is of importance because never before in medical history had the bat been incriminated as a transmitter of disease to man. It is of interest to note that Colonel Hamilton once attempted under the Government of Sir Ralph Woodford, the establishment of a *hato*, or stock-farm, principally for the breeding of horn cattle and horses, in the natural savanna of Erin. The farm did not succeed, if public rumour is to be believed, owing to the ravages among the animals of bats (Vampires) and the ticks" (L AA De Verteuil 1884).

In 1925 towards the end of July, a disease broke out among animals pastured in Port of Spain in both private and public pastures; the number of cows died was twenty (Administrative Reports of the Director of Agriculture, 1923-1948). The Veterinary surgeon diagnosed the disease as bulbar paralysis or botulism or grass disease. In 1926 and 1927 there were no outbreaks of grass disease among cattle. In 1928, a few isolated cases occurred in the Diego Martin and Maraval districts. Unconnected to the deaths in cattle, Waterman, in July 1929, diagnosed a 15 year old boy from Siparia with acute ascending rabic myelitis.(Waterman, 1929). Waterman proposed to the Surgeon General, Dr. Wise, that the disease occurring in humans and cattle was the same and further it was neither botulism nor poliomyelitis. This was rejected by Dr Wise on the grounds that:(1) the disease had been occurring in animals since 1923 but the first report of a similar disease in humans was in 1929, (2) it was a fact that many Indians came into very close contact with these diseased animals but never contacted the disease, (3) the disease occurred only in pastured animals and (4) many persons who contracted the disease had no direct contact with the diseased animals. The dispute raged on with many alternative diagnoses proposed, including acute transverse myelitis, and acute ascending myelitis, apart from acute ascending myelitis and acute anterior poliomyelitis.

In an editorial appearing in the *Lancet*, (The Editor, 1931:641-42), the editor remarks,

“In this issue Dr E Weston Hurst and Dr J L Pawan report an epidemic of acute ascending myelitis which occurred in 1929 in the island of Trinidad, and which there is reason to believe was due to the virus of rabies.” It was not until the experiments by Pawan that the link was firmly established that the disease in humans and cattle was the same.”

On September 18, 1936, Lennox Pawan published his seminal paper titled “Rabies in the vampire bat of Trinidad with special reference to the clinical course and latency of infection”(Pawan 1936). George M Buer records, “...an unusual event of the 20<sup>th</sup> century was the discovery of bat rabies in Brazil and Trinidad” (Winker, 1975). The earlier phases of this interesting study were told by Hurst and Pawan in 1931, following an outbreak of rabies in Trinidad without a history of bites and with symptoms of acute ascending myelitis. Buer continues, “In 1936, Pawan first showed that human beings bitten by vampire bats developed sensory symptoms at the bitten site, followed by paralysis and death.” Buer concludes, “The bats biting the people (referring to the epidemic involving almost eighty-four persons in Trinidad, which has never recurred) were shown to be rabies infected,” thus establishing the mode of transmission in this epidemic.

The events first began with an outbreak of paralytic rabies in Brazil in 1908 where the inhabitants of Santa Catharina and St Pedro d’Alcantara remarked that they saw bats flying around in the day and biting animals in the bright sunshine. The bats later proved to be infected with rabies. Pawan (1936: 402) observed the same phenomenon in Trinidad. He wrote,

“Authentic accounts were received of bats flying and biting animals during the day and actually fighting with one another and with cats, goats and dogs.”

He subsequently captured and examined these bats, and through elaborate experiments proved that they were infected with rabies, a daunting task at that time with limited technological support. He records in his journal that he discovered “a bat caught at Guanapo village and kept in captivity and showing no signs of disease, was found harbouring the virus in its brain.” This was the foundation for his thesis, as he states:

“...firstly it becomes necessary to verify that rabid bats exhibit abnormal habits and secondly to demonstrate the range of clinical manifestations of the disease in infected ones such that it would facilitate the control and prevention of the disease.”

In order to achieve his objective he carefully designed eight experiments. In his first experiment, he captured six bats at the Gasparillo caves in Santa Cruz and by allowing them to bite rabbits, established they were rabies free. He subsequently injected them on October 25, 1935 with 0.1 cm<sup>3</sup> of an emulsion of human derived rabies virus and then set about to observe them. He reports that on January 6, 1936 (two months and twelve days after inoculation with the virus), “bat no #19 was found infected with rabies, without having shown any previous evidence of illness. The hippocampus showed numerous negri bodies.”

In his second experiment, Pawan obtained six bats from St Joseph, proved first that they were free from rabies and then inoculated them with live unattenuated rabies virus. He records on November 25<sup>th</sup>, 1936:

“...clear examination revealed a purulent conjunctivitis of both eyes, and a definite paralysis of the left hind limb and both forearms. She was drowsy and apathetic. Later that day there was incontinence of urine. The following morning the paralysis of the hind limb was more marked and there was much incontinence of urine.”

Experiments 3-8 were of similar design to 1 and 2, clearly demonstrating for the first time that bats can be infected with the rabies virus and the clinical manifestations they possessed. In the discussion of his findings, he establishes the *desmodius rotundus murinus* (the blood lapping vampire bat) was “not only a suitable medium for survival of the virus but a ready means of dissemination. However, an unusual biological process has also come into operation that caused some to develop the disease in its classical form. While others showed mild or latent infection with recovery and the development of a carrier state, others were refractory to infection and showed no clinical evidence of disease, although they were capable of transmitting infection.”[5] In so postulating, Pawan challenges Joseph Koch and Pasteur’s theory of the infectious disease, and actually refers to some of their postulates as “almost heretical”.

Pawan also established in these experiments that it took nine days from inoculation of the bats to the presence of the virus in the brain of the animal. Remlinger and Bailey in their paper, “Le phemonene de la tortue” reported a similar incubation period in turtles. Nicolau, Mathis and Constantinesco also described similar features they called “Oulo-facto” working with indigenous dogs in French West Africa.[6,3]

In summary, Pawan’s contribution to the understanding of the epidemic was derived mainly from the experiments he conducted. These experiments demonstrated unequivocally that vampire bats were susceptible to artificial inoculation with the virus of rabies that produced paralytic type disease or no clinical symptoms, and that they recover from the infection and become capable of spreading infection by their bites for prolonged periods.

## **Conclusion**

In conclusion, this epidemic not only established for the first time the transmission of rabies by *haematophagous* (vampire) bats, characterized by paralysis, but created an almost perpetual fear of vampire bats among the inhabitants. Even today the bat continues to be portrayed with remarkable precision at the annual Carnival. Deeply rooted in Trinidadian folklore is the “soucouyant”, a creature that sails through the air at night in search of human blood. Even the English writer Charles Kingsley who visited the island was particularly impressed at the ability of bats (*noctilio*) catching fish off the cliffs of Monos Island, and described their behavior in his book *At Last, in 1871*.

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