EXPERIMENTAL INFECTION OF THE MULE WITH TRYpanosoma Hippicum By MEANS OF Musca Domestica.*

By S. T. DARLING, M.D.  
(From the Board of Health Laboratories, Isthmian Canal Commission, Ancon, Canal Zone.)

From a study of the epidemiology of an outbreak of trypanosomiasis (murrina) in the Commission corrals, it was found that mules and horses were equally susceptible to the disease; yet, when they were stabled together, mules developed the disease, but saddle horses never became infected.

After an investigation of its nature and probable mode of transmission, it was concluded that the infection was probably conveyed, not by intermediate invertebrate hosts, such as tabanidæ, stomoxys, ticks, etc., but mechanically by flies visiting the excoriated patches on the skin of sick infected animals and transferring the virus on their mouth-parts or legs to fresh cuts, scratches, or galls on uninfected animals.

The mules, from the nature of their work frequently suffered from "scraper cuts," galls, and other injuries in which the skin became broken, while such injuries were rarely noted on the saddle horses.

Recently I have had an opportunity to confirm in a positive manner the theory that Musca domestica might carry the virus mechanically. Through the kindness of the Chief Sanitary Officer and of the Chief Quartermaster, I obtained three mules that had been condemned on account of physical disability and used them in the following experiments:

Three lots of Musca domestica were caught and each was placed in a biting jar. A guinea pig richly infected with Trypanosoma hippicum was bled from the ear. Two or three drops of blood were placed on the center of a glass plate which was inverted over the biting area of the jar containing the flies. Jar A contained about eighteen flies, jar B, nine, and jar C, six. A number of the flies in each jar were seen to feed on the guinea pig's blood, those in jar A being hungrier than the others.

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1 Darling, Jour. Infect. Dis., 1911, viii, 467.
Experimental Infection of the Mule.

The glass plate with the guinea pig blood was carefully replaced by a towel that was used to wipe away any possible droplet of blood that might have touched the rim of the jar, or that might have been deposited near the rim by one of the flies. This was done to prevent any possible inoculation of the mule by guinea pig blood that might be on the margin of the jar. The towel was replaced by a clean glass plate that was slipped out when the biting area of the jar was placed over the recently shaved, scratched skin of the mule. In each experiment the flies were exposed to the guinea pig blood for three or four minutes, and then, after an interval of about thirty seconds, were placed over the scratched skin of the mules where they remained for about five minutes. As the flies were not hungry, they fed with some difficulty, and, as the experiment was conducted out of doors in bright sunlight, they sought the opposite end of the jar and could be made to visit the scratched skin only by covering the jar and making it quite dark. On this account the conditions of the experiment were probably not as favorable for infecting as they would have been under natural conditions in a corral, yet after a period of ten days, the usual incubation period in mules for the strain of *Trypanosoma hippicum* employed, the temperature of one of the animals rose to 103° F., and its blood contained *Trypanosoma hippicum*. The other two mules have shown no signs of infection.

The mule that became infected had been exposed to the flies in jar A, which contained about eighteen active, vigorous specimens that had been caught about two hours before the experiment.

Murrina is not now epidemic in the Canal Zone; in fact, no cases have been detected since May, 1910, so that the possibility of the mule's having become infected in any way other than by that of the experiment is too remote to be considered. Besides, a particularly avirulent strain was used in the experiment, the period of incubation of which (ten days) is two to three days longer than that of other strains. The incubation period in the infected mule corresponds with that of this avirulent strain.

For several days previous to their exposure to the flies, the experimental mules had been under observation in a screened stable; their temperatures were taken twice daily, and their blood examined daily for the detection of trypanosomes.

It would seem, therefore, that the disease in the corrals was propagated mechanically, as has already been suggested, and that *Musca domestica* is capable of transmitting it in this way.

The exact mechanism of infection is not known, but it is believed that the trypanosomes remain alive within the proboscis of the fly, and that infection takes place through that source. Further experiments are under way to determine this point.

*Darling, Parasitology, 1911, iv, 83.*