

INVESTIGATIONS ON THE SENSIBILITY OF *CEBUS CIRRIFER* TO THE YELLOW FEVER VIRUS

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The verification of the sensibility of the *rhesus* to the yellow fever virus has been very helpful in the experimental study of yellow fever, promoting, in a short time, a great increase to the knowledge of this infection.

The results brought about the study of the sensibility of other primates, not only to improve the knowledge of the behaviour of the yellow fever virus, but also to verify if there were some other sensitive species which could be obtained with less difficulty.

Recent jungle yellow fever studies showed the possibility of some species of this group playing an important part in the preservation of the virus in natural conditions. Many experiments on the sensibility of South American monkeys have previously been made, specially by Davis.

Davis and Shannon (1) testified the sensibility of the *Cebus macrocephalus* to Asibi virus, both by inoculation and by the bite of *Aedes aegypti*; Davis (2) succeeded in infecting intraperitoneally *Cebus frontatus* (nom. vulg. "prégo") with *rhesus* blood, and by bite of *Aedes aegypti*, concluding that *Cebus flavus* from Amazonas is less sensitive than the "prégo"; Lloyd and Penna (3) infected *Cebus frontalis* with a neurotropic virus through intracerebral inoculation. According to Davis (7) *Cebus variegatus* is also sensitive to Asibi virus by the bite of *Aedes aegypti*.

Pseudocebus azarae inoculated with the virus of a human yellow fever case of the 1928 epidemic in Rio de Janeiro did not permit conclusive results to Aragão (4).

Saimiri sciureus inoculated by Davis (5) with Asibi virus from *rhesus* and from *Aedes aegypti*, and by Lloyd and Penna (3), intracerebrally, with neurotropic virus, showed to be sensitive in all cases.

Callithrix albicollis was infected by Davis (6) with Asibi virus by the bite of *Aedes aegypti*; Lloyd and Penna (3) obtained the same reaction by intracerebral inoculation of neurotropic virus in *Callithrix albicollis* and *Callitrix* sp..

According to Davis (5 and 7), *Ateles ater*, either inoculated or fed upon by *Aedes aegypti*, reacted to Asibi virus. Lloyd and Penna (3) state that *Ateles paniscus* and *Ateles variegatus* also are sensitive to intracerebral inoculation of neurotropic virus.

Davis (6) infected *Leontocebus ursulus* with Asibi virus by the bite of *Aedes aegypti*; the same results have been obtained with neurotropic virus, by Lloyd and Penna (3).

Lagothrix lagotricha was also tested by Davis (5), presenting positive results, though is showed less sensitive than *Saimiri sciureus*.

The results obtained in Davis' experiments (7) with *Callicebus moloch* infected with Asibi virus were rather doubtful, although this species, as well as *Aotus trivirgatus*, became immune.

According to Davis (7) *Pithecia monacha*, fed upon by *Aedes aegypti*, revealed sensibility to Asibi virus.

Davis (7) succeeded in reisolating the virus from *Alouatta seniculus* three days after being bitten by *Aedes aegypti* infected with the S. R. strain. Aragão (8) could also isolate, after three days, jungle yellow fever virus, of Brazilian origin, inoculated in *Alouatta caraya*.

Davis (7) failed in infecting *Cacajao rubicundus* neither by *Aedes* containing Asibi virus, nor by inoculation with the S. R. strain.

As several cases of jungle yellow fever had been observed in 1936, in the municipality of Botucatu, State of S. Paulo, we decided, because of the facilities afforded at the Fazenda Oito Pontas, a property in which the outbreak was observed, to investigate the behaviour of the virus in the monkeys of that region.

Thanks to the kindness of Cel. Eugenio Artigas, owner of the farm, and with the help of the Instituto Butantan and of Dr. H. B. Aragão, Director of the extinct "Serviço Especial de Defesa contra a Febre Amarella", it was possible to capture, in the short period of one month, January 1938, nine monkeys of the species *Cebus cirrifer* GEOFFR., 1812, with which the experiments were made.

Samples of blood from all the specimens served for intracerebral inoculation in mice. It was not possible to verify, by this method, the presence of natural infection.

The virus used in the following experiments was of the Asibi strain, preserved dry, in vacuum, according to the technique of Sawyer, Lloyd and Kitchen, in the Laboratory of Parasitology, Instituto Butantan.

Cebus 1655. A young animal, subcutaneously inoculated on February, 17, 1938, with 2 c.c. of Asibi virus diluted to 1:20. The temperature oscillated between 39°4C. and 39°5 until the 3rd day, rising to 40° on the 4th day, when it was bled for reisolation of the virus. The thermic curve was about 39°5 up to the 9th day, reaching again 40° on the 18th and 19th days. Six mice were inoculated with the blood of the 4th day; one of them died after 9 days and another after 16 days, four passages having been made in mice with the reisolated virus.

Cebus 1654, ♀ adult and 1656 young. Intraperitoneally inoculated on February 17, 1938, respectively with 4 c.c. and 1 c.c. of Asibi virus diluted to 1:20. Bleedings made on February 21, and March 4, 1938, and followed by intracerebral inoculation of 0,03 c.c. of blood in mice, did not show the existence of circulating virus. Notwithstanding, the temperature of No. 1654 attained 40° C. on the 5th day, 40°3 on the 6th, 40°5 on the 7th, 40°4 on the 8th, and 40°2 on the 9th, returning to 39°7 (normal average temperature in this animal).

Cebus 1656 presented febrile reaction at the same occasion, this being, however, the only symptom perceived.

Cebus 1657, ♀ adult, but young. Inoculated on February 2, 1938 with 1 c.c. of Asibi virus at 1:20 intracardially. The temperature was below 40° C. only during the first three days; on the 4th day the temperature was at 40°, rising to 40°5 on the 5th day, staying between 39°9 and 41° until the 20th day. The inoculation of blood taken on the 4th day induced a typical paralysis to all of the mice; the virus thus reisolated had four more passages through mice. No results was obtained when the reisolation of the virus was again attempted on the 9th day.

Cebus 1651 ♂, aged specimen. Inoculated intracardially, on February 17, 1938, with 1 c.c. of Asibi virus at 1:20. The temperature of this animal was almost always over 40° C. even before the inoculation, rising twice to 41° from the 5th to the 8th day. The virus was reisolated from the blood of the 4th day, and intracerebrally inoculated in mice; various passages have been made with this material. A new experiment of reisolation, made on the 9th day, was discontinued, as all of the mice died incidentally.

Cebus 1647 ♂, adult. Inoculated with 2,5 c.c. of Asibi virus at 1:10, intravenously, on January 1, 1938. The reisolation of the virus, attempted on the 7th and 14th days, proved to be of no result, in spite of a slight temperature rise on the 7th to the 9th day, when the remperature attained 40°3 C..

Cebus 1648 ♀ adult, still young. Inoculated intracerebrally, on February 11, 1938, with 0,5 c.c. of neurotropic virus. It was already ill on February 16, showing a loss of activity, paralysis occurring on February 19 (Fig. 1). The normal temperature of 39°5 C., noticed on the first three days, reached 40° on

the 4th, and 41°1 on the 6th day, falling to 38°8 on the 8th, and rising again to 39°5 on the 10th day. The reisolation of the virus could not be obtained from the cerebrum and from the liver of this animal, sacrificed on February 21, 1938. The circulating virus also could not be reisolated on the 3rd and 10th day.

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CONCLUSIONS

Cebus cirrifer proved to be sensitive to the Asibi virus inoculated both subcutaneously and intracardially; the age of the animal does not seem to have influence on its sensibility. This infection did not cause the death of any of the tested animals, the virus having been reisolated until the 4th day.

Two Asibi virus intraperitoneal inoculations and one intravenous were followed by thermic rise in specimens of *Cebus cirrifer*, but no reisolation of the virus was obtained.

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