

DENGUE VIRUSES AND OTHER ARBOVIRUSES IN FRENCH GUIANA

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There is no proof that yellow fever occurred in French Guiana before 1763. The first report of "vomito negro" appears during the Kourou expedition in 1763. From 1763 to 1888, yellow fever was reported repeatedly. Epidemics were observed in 1765, 1793-1796, 1802, 1850, 1855 (with 27.2% mortality), 1873-1874, 1876, 1877, 1885. In 1902 an epidemic started in St-Jean-du-Maroni and reached Cayenne in a few months: 471 cases were recorded with 139 deaths. It seems to have been an *Aedes aegypti* transmitted epidemic. Since 1902, no yellow fever case has been reported.

In 1966, virology became an important part of the activities of the Institut Pasteur. The U7 9 INSERM Group (Research on arbovirus diseases) was established in 1968. Investigations were carried out on yellow fever and several viruses were found, some already known, some previously unknown. The U7 9 INSERM Group ended in 1979. Since then work has been concentrated on dengue fever surveillance.

1. DENGUE

The etiology of dengue epidemics recorded in the past should be considered with a certain distrust: until recently dengue diagnosis was based only on clinical manifestations.

In French Guiana, the first confirmed dengue epidemic occurred in 1969-1970: dengue 2 virus was isolated and serological conversions were noted in three patients. From 1970 to 1977 dengue virus was not isolated.

In 1977, the first cases occurred in January and the epidemic reached its peak in March. It started in the town of Cayenne and moved towards Sinnamary in May

and Saint-Laurent in July. 21 strains were isolated: all the virus identifications confirmed that the epidemic was caused by type 2 dengue. The number of cases was hard to assess but in no way did this appear to be a true urban epidemic but rather a regular succession of cases constituting small family epidemics. On the clinical level, the symptomatology was classic and despite rare cases of purpuric type rashes with nose bleeding, there was never any example of true hemorrhagic dengue.

From 10 pools of mosquitoes caught in the dormitories of the religious community of Sinnamary 4 strains of dengue 2 virus were isolated: three from *A. aegypti* and one from *Coquillettidia venezuelensis* mosquitoes caught under the same conditions. All the four strains were isolated in LLC-MK2 after intra thoracic inoculation to groups of 10 laboratory reared *A. aegypti* mosquitoes. Suckling mice inoculated at the same time did not show any symptoms during 21 days of observation. No blind passages were made.

In March 1978, we again noted a few cases in the town of Cayenne. A type 1 dengue virus was isolated during the first days of March and 30 others have been isolated since. This was the first time dengue 1 virus was detected in French Guiana. All the cases were found in man.

Following this outbreak, only one strain of dengue 1 virus was isolated in 1979.

Nevertheless, serological studies have shown that, in 1979, 37 sera of 400 studied have a CF titer of 1/64 or more for all the Group B viruses, with a great probability for the activity of a dengue virus.

During the course of our studies on dengue virus a new technique for isolating and identifying dengue virus was developed.

2. OTHER ARBOVIRUSES

2.1. Alphavirus (Group A)

2.2.2. Mucambo

The virus belongs to the VEE virus group (Subtype III). In man, it has been isolated from laboratory acquired infections only.

In French Guiana it has been isolated for the last time from a pool of *Lutzomyia* phlebotomine flies collected in Montsinery in November 1972 and from birds (*Turdus nudigenis*, *Tachyphorus cristatus*, *Frogon violaceus*, *Monasa atra*) caught in Maripasoula in March 1972.

Since then it has never been isolated again and seems to have been replaced by another virus of subtype III, Tonate (Ca An 410 d).

2.1.2. Tonate (Ca An 410 d)

First isolated from a bird *Psarocolius decumanus* caught in Tonate in January 1973 it has been isolated since from other species of birds and from *Culex portesi*

and other mosquito species (*Cq. venezuelensis*, *C. albicosta*, *M. pseudotitillans*, *Cx. spissipes*, *Cx. zeteckii*).

The virus has been isolated from patients suffering from a febrile disease. Serological surveys have shown that this virus is active in the Guyanese population: antibodies for this virus have been found in 11% in Cayenne, 15% in Remire, 24% in Matoury, 28% in Saint-Georges and 35% in Régina.

2.3.1. Cabassou (Ca Ar 508)

The prototype of Cabassou virus was isolated from *Culex portesi* mosquitoes. In addition to the strain Ca Ar 508, several other strains were obtained from this same species of mosquito as well as from a bat caught in Saint-Laurent du Maroni. Mice inoculated with this virus resist an intracerebral infection with a pathogenic strain of VEE virus, subtype II (Everglades).

2.1.4. Una

In French Guiana, Una virus has been isolated from *Psorophora ferox* in the coastal area and from *Psorophora lutzii* in Maripasoula.

2.1.5. Aura

In French Guiana, this virus has been isolated from *Aedes serratus*. An important fact is the isolation of a strain of this virus from the blood of a patient suffering from an acute hepatitis. Unfortunately the patient died and the difenite proof that the virus was the cause of disease is lacking.

2.2. Flavivirus (Group B)

2.2.1. Ilheus

In French Guiana, this virus has been isolated from birds *Leistes militaris*, *Playa minuta*, *Momotus momota* and from the blood of a patient suffering from febrile illness.

2.2.2. Saint-Louis Encephalitis

In French Guiana, SLE virus was first isolated from a pool of *Culex sp.* mosquitoes in September 1967 and then from a bird *Anhinga anhinga* in 1977.

2.3. Bunyavirus

2.3.1. Group C viruses

All group C viruses isolated in French Guiana are identical with (or very close to) Caraparu, Murutucu and Oriboca.

2.3.1.1. Murutucu

Strains of this virus have been obtained in French Guiana from *Culex portesi* and *Anopheles peryassui* mosquitoes. On 3 occasions an isolation has been made from patients with fever, headache and myalgia.

2.3.1 Oriboca

This virus has been found in *Culex portesi* in French Guiana but has never been isolated from man.

2.3.1.3. Caraparu

Strains of this virus have been isolated in French Guiana from *Culex portesi* and *Limatus durhami* mosquitoes.

2.3.2. Bunyamwera group

2.3.2.1. Guaroa

In French Guiana, this virus has been isolated once from a pool of *Anopheles peryassui* mosquitoes caught at Camp du Gallion not far from Cayenne.

2.3.2.2. Maguari

The first strain isolated in French Guiana was obtained from *Wyeomyia* sp. mosquitoes. Several strains were isolated from *Wyeomyia aphobema*, *Wyeomyia occulta* and *Culex portesi*.

2.3.2.3. Wyeomyia

Several strains of *Wyeomyia* virus have been isolated in French Guiana from *Wyeomyia occulta* mosquitoes and also from *Culex portesi*, *Trichoprosopon longipes* and *Aedes taeniorhynchus*.

2.3.3. Guama group

Most of the strains of the viruses of this group have been classified as "Guama group virus" as it is impossible to separate the three viruses active in French Guiana-Guama, Catu, Bimiti – by complement fixation tests and the isolates were so numerous that we do not deem it necessary that N tests should be done for all the isolates. Nevertheless plaque reduction tests have been done with a certain number of strains. If we consider the Guama group as a whole, these viruses have been

isolated from 14 species of arthropods, 13 species of birds and 2 species of mammals. *Culex portesi* and *Coquillettidia venezuelensis* are by far the main vectors. Mosquito infection rates are maximum in February-March (short dry season) and in July-August (beginning of the dry season). *Didelphis marsupialis* is the main vertebrate host.

2.3.3.1. Guama

This virus has been isolated from *Culex portesi* and *Trichoprosopon longipes* mosquitoes and from the marsupial *Didelphis marsupialis*.

2.3.3.2. Bimiti

Several strains have been isolated from *Culex portesi*, *Culex taeniopus*, *Coquillettidia venezuelensis* mosquitoes and from a bird *Galbula dea*.

2.3.3.2. Catu

Strains of Catu virus were isolated from *Culex portesi* mosquitoes and *Didelphis marsupialis*.

2.3.4. Simbu group

Only one virus of this group has been isolated in French Guiana and it appears to be a new member of the group: Inini virus (Ca An 1093 a) was isolated from the blood of a bird *Pteroglossus aracari* caught at the Maripasoula field station in October 1973. It shows some antigenic relationships with Mermet and Ingwavuma viruses.

2.4. Bunyamwera like

Only one virus of the Phlebotomus group, Itaporanga was isolated in French Guiana. The first isolate was obtained from a pool of *Culex albinensis* mosquitoes in May 1968. Several other strains were obtained from the same mosquito species in 1976-1977.

2.5. Ungrouped

2.5.1. Aruac

Several strains of this virus have been isolated from mosquitoes: *Coquillettidia venezuelensis*, *Mansonia albicosta* and *Culex sp.* The vertebrate host is unknown.

2.5.2. Rochambeau (Ca Ar 161 02)

This new virus was obtained from a pool of *Coquillettidia albicosta* caught on human bait at the Paramana field station, near Rochambeau Airport in September 1973. It shows no relationship with any of the viruses with which it has been compared. Ever since it has not been isolated again.

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