Virus Name: Uganda S	Abbreviation: UGSV

Status
Arbovirus

Select Agent
No

SALS Level
2

SALS Basis
Results of SALS surveys and information from the Catalogue.

Other Information

Antigenic Group
B

SECTION I - Full Virus Name and Prototype Number

Prototype Strain Number / Designation
Original

Accession Number

Original Date Submitted
2/3/1985

Family
Flaviviridae

Genus
Flavivirus

Information From
J.P. Woodall

Address
YARU, Yale University School of Medicine, New Haven, Connecticut 06510, USA

Information Footnote
Reviewed by editor

Section II - Original Source

Isolated By (name)
Dick and Haddow (1)

Isolated at Institute
Entebbe, Uganda

Host Genus
Mixed Aedes spp.

Species

Host Age/Stage
Adult

Sex
Female

Isolated From

Isolation Details

Signs and Symptoms of Illness

Arthropod

Time Held Alive before Inoculation

Collection Method
In tubes, collected from human bait

Collection Date
4/27/1947

Place Collected (Minimum of City, State, Country)
Bwamba County, Western Uganda

Latitude
0° 44' N

Longitude
30° 3' E

Macrohabitat
Tropical rain forest

Microhabitat
Forest canopy

Method of Storage until Inoculated
In tubes at 4dC

Footnotes

Section III - Method of Isolation

Inoculation Date
5/3/1947

Animal (Details will be in Section 6)
wn mice

Route Inoculated
Intracerebral

Reisolation
Not tried

Other Reasons
Never isolated from mouse colony, which is also nonimmune

Homologous Antibody Formation by Source Animal

Test(s) Used

Footnotes

Section IV - Virus Properties

Physicochemical

Pieces (number of genome segments)	Infectivity	Sedimentation Coefficients (s) (S)
Percentage wt, of Virion Protein	Lipid	Carbohydrate
Virion Polypeptides: Number	Details	
Non-virion Polypeptides: Number	Details	
Virion Density	Sedimentation Coefficients(s) (S)	
Nucleocapsid Density	Sedimentation Coefficients(s) (S)	

Stability of Infectivity (effects)

pH (infective range)

Lipid Solvent (ether - % used to test)	After Treatment Titer	Control Titer
Lipid Solvent (chloroform)	After Treatment Titer	Control Titer
Lipid Solvent (deoxycholate)	After Treatment Titer	Control Titer

Other (formalin, radiation)
2.8-3.9 dex inactivated following tr. with 1:1000 deoxycholate (3)

Virion Morphology

Shape	Dimensions **15-112 nm**	
Mean nm	Range nm	
Measurement Method **Membrane filtration (1,2)**	Surface Projections/Envelope	Nucleocapsid Dimensions, Symmetry

Morphogenesis

Site of Constituent Formation in Cell	Site of Virion Assembly	Site of Virion Accumulation
Inclusion Bodies	Other	

Hemagglutination

Hemaggiutination	Antigen Source	Erythrocytes (species used)
Yes	**SMB, human amnion cell culture ext. by acetone-ether; sucrose-acetone; fluorocarbon**	**Goose***

pH Range	pH Optimum
6.0-6.8	**6.4**

Temperature Range	Temperature Optimum
4-37dC	**37dC**

Remarks
*** Also chick (4), cockerel, and hen if protamine antigen used**

Serologic Methods Recommended
NT, HI, CF

Footnotes
*** Also chick (4), cockerel, and hen if protamine antigen used**

Section V - Antigenic Relationship and Lack of Relationship to Other Viruses

Cross-reactive in HI tests with other Group B hyperimmune sera [5] .

By CF, more closely related to yellow fever than to other Group B viruses [7] , [8] .

Very closely related to Banzi virus [6] .

	Neutralization Index	
Serum	**Banzi virus**	**Uganda S virus**
Uganda S monkey	0.1	2.36
Uganda S guinea pig (a)	0.97	2.7
Uganda S guinea pig (b)	0.6	1.85
Banzi guinea pig (a)	2.22	1.4
Banzi guinea pig (b)	1.75	2.54

Tests done in young adult mice ic; neutralization index in dex.

Section VI - Biologic Characteristics

Virus Source (all VERTEBRATE isolates)
Blood (M)(LV)

Lab Methods of Virus Recovery (ALL ISOLATIONS)
Newborn mice

Cell system (a)	Virus passage history (b)	Evidence of Infection							
		CPE			PLAQUES			Growth Without CPE	
		Day (c)	Extent (d)	Titer TCD50/ml (e)	Day (c)	Size (f)	Titer PFU/ml (e)	+/- (g)	
Chick embryo (PC)	Prototype				2-3	Plaques			
Hamster kidney (PC)			Growth						
Human amnion(PC)			Growth						
Duck kidney (PC)			CPE			Plaques			
Vero (CL)	P-23				4	3 mm	7.7** (25)		
LLC-MK2 (CL)					5	3 mm	8.4 (25)		

** Expressed in dex

Section VII - Natural Host Range (Additional text can be added below table)

Vertebrate (species and organ) and arthropod	No. isolations/No. tested	No. with antibody/No. tested Test used	Country and region
Man	See below	39/705 NT	Uganda, Tanganyika (1, 9, 11)
Man		4/178 NT	Egypt (21)
Man		47%/304 NT	Nigeria
Man		up to 5% NT	Mozambique
Man		105/625 NT	S. Africa (14)
Man		32%/440 HI	Senegal (19)
Man		21/197 NT	India (12)
Man		24/246 NT	Malaysia; Borneo, Indonesia (11, 13)
Saxicola rubetra (bird)	1		Central African Republic (22)
Sentinel mice	2		Nigeria (23, 26)
Wild monkeys (4 spp.)		1/9 NT	Uganda (1)
Aedes (Fin) longipalpis	47		Bwamba, Uganda (1)
Aedes (Fin) ingrami	1/17		
Aedes (Adm) natronius	1		

Makonde virus isolated from man and mosquitoes during studies on the original chikungunya epidemic (10) was subsequently identified as Uganda S (17). As some doubt attaches to the validity of these isolations, they are not included.

Section VIII - Susceptibility to Experimental Infection (include viremia)

Experimental host and age	Passage history and strain	Inoculation Route-Dose	Evidence of infection	AST (days)	Titer log10/ml
Mice (nb)	P-11	ic 0.02	Death	5.0	11.0
Mice (nb)		ip			
Mice (nb)		sc			
Mice (wn)	P-3-15	ic 0.03	Viremia (1,24)	3.6-6.2	8.6
Mice (wn)		ip 0.06	Paralysis and death		3.7-6.2
chicks		iv	Viremia (24)		
cotton rats		ic or ip	None		
guinea pigs		ic or sc	Antibody		
rabbits		ic	Antibody (1)		
rhesus monkeys	P-9-41	sc	1/5 had viremia >1 day, 4/5 antibodies		
wild monkeys	P-10-54	sc, intrathalamic	4/8 had viremia >1 day, 6/8 antibodies		
chick embryos (6-11 days)	Prototype	ys, am.s.	Embryos became infected, but survived (16)		

Section IX - Experimental Arthropod Infection and Transmission

Arthropod species & virus source(a)	Method of Infection log10/ml (b)		Incubation period (c)		Transmision by bite (d)		Assay of arthropod, log10/ml (e)		
	Feeding	Injected	Days	°C	Host	Ratio	Whole	Organ	System
Aedes aegypti	Original (15) and Makonde (19) strains transmitted. Remain infected 98 days.								
Culex tarsalis	Original passed 5 times by intrahaemocoelic inoculation								
Ornithodoros savignyi	Passed 5 times by intrahaemocoelic inoculation								
Attagenus piceus	Passed 5 times by intrahaemocoelic inoculation								
Culex salinarius	Mosq. inoculated parenterally maintained the virus through 29 salivary gland passages.								
	Ae aegypti transmitted from mouse to mouse.								

Section X - Histopathology

Character of lesions (specify host)
In mice: encephalitis; lesions confined to CNS, brain more involved than cord (1).

Inclusion Bodies — Intranuclear

Organs/Tissues Affected
Brain (LV), spinal cord (LV), lungs (LV), kidney (LV), heart (LV)

Category of tropism
Neurotropic in mice, but virus found in viscera after ip inoc.

Section XI - Human Disease

In Nature	Residual	Death
Subclinical	Overt Disease	
Clinical Manifestations		
Number of Cases	Category (i.e. febrile illness, etc.)	

Section XII - Geographic Distribution

Known (Virus detected)
Uganda, Nigeria, Central African Republic

Suspected (Antibody only detected)
Egypt, Tanganyika, Mozambique, Gambia, S. Africa, Senegal. Far East: India; Malaysia; Borneo, Indonesia.

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Remarks