Virus Name: Orungo		Abbreviation: ORUV
Status **Probable Arbovirus**	Select Agent **No**	SALS Level **3**

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

Other Information

Antigenic Group
Ungrouped

SECTION I - Full Virus Name and Prototype Number

Prototype Strain Number / Designation	Accession Number	Original Date Submitted
UgMP 359		8/14/1984

Family	Genus
Reoviridae	**Orbivirus**

Information From	Address
Dr. O. Tommori	**Virus Research Laboratory, University of Ibadan, Nigeria**

Information Footnote
Reviewed by editor

Section II - Original Source

Isolated By (name)	Isolated at Institute	
Williams and Woodall (1)	**East African Virus Research Institute**	
Host Genus **Anopheles funestus**	Species	Host Age/Stage **Adult**

Sex
Female

Isolated From	Isolation Details
Signs and Symptoms of Illness	Arthropod **Engorged**

Time Held Alive before Inoculation
2-3 days, then frozen

Collection Method	Collection Date
Human bait	**9/8/1959**

Place Collected (Minimum of City, State, Country)
Orungo, Teso District, Uganda

Latitude	Longitude
2° 3' N	**33° 28' E**

Macrohabitat	Microhabitat	Method of Storage until Inoculated
Low open savannah, 3,500 feet above sea level	**In mosquito nets inside huts**	**Deep freezer (see 6 above)**

Footnotes

Section III - Method of Isolation

Inoculation Date
10/1/1959

Animal (Details will be in Section 6)
nb mice

Route Inoculated
Intracerebral

Reisolation
Not tried

Other Reasons
First virus of thistype in the laboratory

Homologous Antibody Formation by Source Animal

Test(s) Used

Footnotes

Section IV - Virus Properties

Physicochemical
RNA

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)
Labile at pH 3; after treatment 1.5 dex, control 4.6 dex (3 hours at 4C)(4)

Lipid Solvent (ether - % used to test) **1:2**	After Treatment Titer **3.9 dex**	Control Titer **5.5 dex**
Lipid Solvent (chloroform) **10%**	After Treatment Titer **4.6 dex**	Control Titer **6.3 dex**
Lipid Solvent (deoxycholate) **1:1000**	After Treatment Titer **4.3 dex**	Control Titer **5.7 dex**

Other (formalin, radiation)
Inact. by 0.2% BPL, 0.08% formalin at 4/C for 4 days and UV irrad. (4,11)

Virion Morphology

Shape **Spherical (5)**	Dimensions	
Mean **63 nm**nm	Range **58-72**nm	
Measurement Method **Thin-section electron microscopy (5)**	Surface Projections/Envelope **Few particles show "pseudoenvelope"**	Nucleocapsid Dimensions, Symmetry

T = 3

Morphogenesis

Site of Constituent Formation in Cell	Site of Virion Assembly	Site of Virion Accumulation
Cell cytoplasm	**In specific viral matrix**	**In specific viral matrix**

Inclusion Bodies	Other
	Orbivirus taxon (2,3,5)

Hemagglutination

Hemaggiutination	Antigen Source	Erythrocytes (species used)
No	**SMB sucrose-acetone; son., tryp. tr., prot. tr.**	**Several***

pH Range	pH Optimum
5.8-7.4	

Temperature Range	Temperature Optimum
4dC, room and 37dC	

Remarks
*** Goose, sheep, goat, patas rhesus, hamster and human O.**

Serologic Methods Recommended
CF, NT

Footnotes
*** Goose, sheep, goat, patas rhesus, hamster and human O.**

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

Entebbe Studies [1] . No relation demonstrated by CF between MP 359 antiserum and 26 antigens of arboviruses recorded from Africa which lie outside Casals' groups A or B, or Ndumu, CHF-Congo group, CAN 230 strain of reovirus and RVF.
Ibadan Studies [4] . (a) In CF, using both IBH 13019 and original MP 359, no reaction with antigen, immune serum, or both of listed viruses.

Group A:	chikungunya, Igbo-Ora (IbAn 10964), Mayaro, Middleburg, Ndumu, o'nyong-nyong, Semliki Forest, Sindbis.
Group B:	Banzi, Bouboui, Bukalasa bat, Dakar bat, dengue 1-4, Entebbe bat, Ilheus, Koutango, Modoc, Ntaya, Potiskum, Saboya, Sponweni, Tyuleniy, Uganda S, Usutu, Wesselsbron, West Nile, yellow fever, Zika.
Group C:	Pool of Group C MIAF's obtained from YARU.
Bunyamwera group:	Batai, Bunyamwera, Cache Valley, Germiston, Ilesha, Lokern, Maguari, Main Drain, Shokwe, Ukauwa, MP 6830.
California group:	California encephalitis, Lumbo, Melao.
Simbu group:	Akabane, Buttonwillow, Ingwavuma, Manzanilla, Oropouche, Sabo, Sango, Sathuperi, Shamonda, Shuni, Simbu, Utinga, Yaba 7.
Bwamba group:	Bwamba, Pongola.
Orbiviruses:	Abadina, bluetongue, Chenuda, Colorado tick fever, EHD-NJ, IbAr 22619, Kemerovo, Lebombo, Pata, Wad Medani.
Rhabdoviruses:	bovine ephemeral fever, kotonkan, Mokola, Mossuril, Nigerian horse sickness, Piry, rabies, vesicular stomatitis.
Phlebotomus fever group:	Arumowot, Chagres, Itaporanga, Gabek Forest.
Others:	Bandia, Bhanja, Bobia, Boteke, Botambi, Capim, Congo, Dugbe, Eretmapodites 147, foot-and-mouth disease, Gossas, Guama, Jos, Kaisodi, Keuraliba, Le Dantec, M'Poko, Nairobi sheep disease, Nkolbisson, Nyamanini, Nyando, Ofoumselek, Okola, Olifantsvlei, Quaranfil, RVF, Sakhalin, Somone, Tacaribe, Tanga, Tataguine, Tete, Thogoto, Toure, Witwatersrand, Yogue, IbAn 2898, IbAn 28946, IbAn 33853, IbAn 17143, IbAn 33709, IbAn 54147, IbH 51378, IbH 41705, EgAn 6165-63, EgAn 1398-61, Lassa, Turlock, mouse polio, Herpes, NDV.

(b) Ibadan isolates of MP 359 shown by CF and N tests to be indistinguishable from original isolate of MP 359 recovered in Uganda. Original isolate obtained by courtesy of Director, EAVRI.

Section VI - Biologic Characteristics

Virus Source (all VERTEBRATE isolates)
Blood (M)

Lab Methods of Virus Recovery (ALL ISOLATIONS)
Newborn mice, Vero cell cultures

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)
Vero (CL)	SMB 7	3	4+	7.5**	3	1-2mm	5.2** (13)	
BHK-21 (CL)		2	4+	6.8				
MA-111 (CL)			No CPE					-
DE (PC)			No CPE					-
Aedes albopictus (CL)			No CPE					-

** 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 (blood)	8	277/1197 NT	Nigeria (4, 6)
Man		12/174 NT	Sierra Leone, east.and west. provinces(9)
Man (blood)	1		Senegal (10)
Primates	0/80	4/40 NT	Nigeria (6, 8)
Sheep	0/59	15/44 NT	
Cows	0/212	10/86 NT	
Insectivora (shrews, Atelerix)	0/48	0/74 NT	

Rodentia	0/271	0/82 NT	
Aves	0/103	0/30 NT	
Chiroptera	0/130	0/6 NT	
Anopheles funestus	1/2,284		Orungo, Uganda (1)
Aedes dentatus	1		Nigeria (4)
Culex perfuscus	1		Central African Republic (7)
Anopheles gambiae	1		Central African Republic (10)
Culicoides	0/many		Nigeria (8)
Aedes (Dic) sp. (male)	1		Ivory Coast (16)
Aedes aegypti	1		
Sheep		27 CF	N. Nigeria (17)
Cattle		7 CF	
Goats		31 CF	
Camels		38 CF	

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)	SMB 7	ic 0.02	Death* (12)	3.5	8.5
Mice (nb)		ip 0.03	None		
Mice (nb)		sc 0.02	None		
Mice (wn)		ic			
Mice (wn)		ip			
Mice (10-day)		ic 0.02	Death	6.7	5.0
Mice (10-day)		ip 0.03	None		

hamster (2-day)		ic 0.02	Death (12)	3-4	7.2
		ip 0.03	Death, viremia	0-12	5.0
		sc 0.02	None		
hamster (3 wk)		ip 0.1	Antibody (12)		
		sc 0.1	Antibody		
rabbit (ad)	SMB 3	ic 0.5	None (12)		
		ip 2+5	Antibody		
		sc 2.0	Antibody		
		iv 2.0	Antibody		
lambs (4-6 wk)		iv 1.0	Antibody in 2 weeks (12)		
		sc 1.0	None		
sparrow (ad)	SMB 7	iv 0.1	None (12)		
		sc 0.1	None		
chick (1 day)		iv 0.1	None (12)		
		sc 0.1	None (12)		

* Viremia inconsistent

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
Adult female Ae albopictus and Ae aegypti mosq. were exposed to Orungo virus by intrathoracic inoc. and oral ingestion. After 6 days, virus was demonstrated in 1 orally exposed mosq., but only inoculated mosquitoes transmitted the virus to blood droplets after extrinsic incubation of 6-10 days. Transmission attempts using infant mice were negative (14).									

Section X - Histopathology

Character of lesions (specify host)
Mice (10-day) inoculated ic show "rod cell" formation (elongation of microglia cells), perivascular cuffing of blood vessels and swelling of the vascular epithelium of the brain cortex.

Inclusion Bodies — Intranuclear

Organs/Tissues Affected

Category of tropism

Section XI - Human Disease

In Nature
Significant

Residual

Death
Reported

Subclinical
Reported

Overt Disease

Clinical Manifestations
Fever (S), headache (S), myalgia (S), vomiting (S), conjunctival inflammation (R)

Number of Cases
60

Category (i.e. febrile illness, etc.)
Febrile

Section XII - Geographic Distribution

Known (Virus detected)
Uganda, Nigeria, Central African Republic (4,7,10), Senegal (10), Ivory Coast (16)

Suspected (Antibody only detected)
Sierra Leone (6,9)

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Remarks