

Virus Name: Ndumu		Abbreviation: NDUV
Status Probable Arbovirus	Select Agent No	SALS Level 3
SALS Basis Disease is sheep, cattle, or horses.		
Other Information		
Antigenic Group A		

SECTION I - Full Virus Name and Prototype Number

Prototype Strain Number / Designation SAAr 2204	Accession Number	Original Date Submitted 10/5/1984
Family Togaviridae	Genus Alphavirus	
Information From B.M. McIntosh	Address National Institute for Virology, P/Bag X4, Sandringham, 2131, South Africa	
Information Footnote Revised		

Section II - Original Source

Isolated By (name) R.H. Kokernot, et al. (1)	Isolated at Institute S. Afr. Inst. Med. Res., Johannesburg	
Host Genus Mansonia uniformis	Species	Host Age/Stage Adult
Sex Female		
<u>Isolated From</u>	<u>Isolation Details</u>	
Signs and Symptoms of Illness	Arthropod	
Time Held Alive before Inoculation A few hours		
Collection Method By hand off vegetation	Collection Date 5/7/1959	
Place Collected (Minimum of City, State, Country) Ndumu Game Reserve, Natal, South Africa		
Latitude 27° S	Longitude 32° E	
Macrohabitat Tropical, coastal lowland	Microhabitat Savannah woodland	Method of Storage until Inoculated Solid CO2
Footnotes		

Section III - Method of Isolation

Inoculation Date
5/19/1959

Animal (Details will be in Section 6)
nb mice

Route Inoculated
Intracerebral

Reisolation
Yes

Other Reasons
Another strain (Ar 2211) isolated from Aedes circumluteolus collected May 5, 1959, same locality.

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) 1:1000	After Treatment Titer 1.6 dex	Control Titer 5.6 dex
Other (formalin, radiation)		

Virion Morphology

Shape	Dimensions	
Mean nm	Range nm	
Measurement Method	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

Hemagglutination Antigen Source Erythrocytes (species used)
Yes **SMB ext. by sucrose-acetone** **Goose**

pH Range pH Optimum
5.7-6.5 **6.2**

Temperature Range Temperature Optimum
Room temperature

Remarks
HA not obtained consistently.

Serologic Methods Recommended
CF, NT

Footnotes
HA not obtained consistently.

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

HIAF	NDU Antigen [2] CF	Antigens	NDU HIAF [2] CF
Chikungunya	>128	Chikungunya	>32
Middelburg	32	Middelburg	32
Semliki Forest	>1024	Semliki Forest	>32
Sindbis	>512	Sindbis	>32

Results expressed as quotient of Ho/Ht titers

In cross PRNT, NDU virus was neutralized to a titer of 15 by a Whataroa antiserum (Ho titer = 100) but no reactions either way were obtained with WEE, Sindbis, Aura, VEE, Mucambo, Pixuna, Semliki Forest, Mayaro, chikungunya, Una, o'nyong nyong, Bebaru, Getah, Ross River, EEE, and Middelburg [3].

In cross-neutralization tests in micro-cell culture NDU virus was neutralized by Aura antiserum Ho LNI (dex)/Ht LNI (dex) = 6.0/1.2) but not by antisera of 20 other group A viruses. NDU antiserum neutralized WEE virus (4.3/1.0) but none of the viruses [4].

Placed in WEE serological subgroup as a distantly related member [5]. SIRACA has not placed NDU virus in the WEE complex. The virus is considered to be a distinct type which is not closely related to any other group A arbovirus; and thus has been placed in the Ndumu complex [12].

Section VI - Biologic Characteristics

Virus Source (all VERTEBRATE isolates)

Lab Methods of Virus Recovery (ALL ISOLATIONS)
Newborn mice

Cell system (a)	Virus passage history (b)	Evidence of Infection						
		CPE			PLAQUES			Growth Without CPE +/- (g)
		Day (c)	Extent (d)	Titer TCD50/ml (e)	Day (c)	Size (f)	Titer PFU/ml (e)	
BHK-21 (CL)	MB 6	2	4+	8.0* (6)				
Vero (CL)	MB 7				2	9 mm	8.3* (7)	
LLC-MK2 (CL)					3	6 mm	8.6 (7)	

* Expressed in dex

Vertebrate (species and organ) and arthropod	No. isolations/No. tested	No. with antibody/No. tested Test used	Country and region
Man		5/66 NT	Mozambique (1)
Man		12/86 NT	Natal, South Africa (1)
Man		5/89 NT	Botswana (1)
Man		4/636 NT	South Africa (9)
Cattle (organs of adult, foetus)	2		Zimbabwe (8)
Mansonia uniformis	1		Natal, South Africa (1)
Aedes circumluteolus	2		Natal, South Africa (1, 2)
Aedes abnormalis group	1		Central African Republic (10)
Aedes dalzieli	2		Senegal (11)
Aedes minutus	1		

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)		ic	Death	3	8.7
Mice (nb)		ip	Death	3	8.7
Mice (nb)		sc			
Mice (wn)		ic	Death	7	8.7
Mice (wn)		ip	Low mortality		<2.0
guinea pig (ad)		ic	Antibody		
vervet monkey (ad)		ic	Viremia		

Section IX - Experimental Arthropod Infection and Transmission

Arthropod species & virus source(a)	Method of Infection log10/ml (b)		Incubation period (c)		Transmission by bite (d)		Assay of arthropod, log10/ml (e)		
	Feeding	Injected	Days	°C	Host	Ratio	Whole	Organ	System
Ae aegypti	8.2		12	26	hamster	54 mosq. fed on 2 hamsters-both infected (2) 2/10 mosq. infected day 14(2)			

Section X - Histopathology

Character of lesions (specify host)	
<u>Inclusion Bodies</u>	<u>Intranuclear</u>
Organs/Tissues Affected	
Category of tropism	

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) South Africa (1), Zimbabwe (8), Central African Republic (10), Senegal (11)
Suspected (Antibody only detected) Mozambique (1), Botswana (1)

Section XIII - References

1. Kokernot, R.H., et al. 1961. Am. J. Trop. Med. and Hyg. 10:383-386.
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6. Karabatsos, N., and Buckley, S.M. 1967. Am. J. Trop. Med. Hyg. 16:99-105.
7. Stim, T.B. 1969. J. Gen. Virol. 5:329-338.
8. Swanepoel, R. and Blackburn, N.K. Personal communication. 1978.
9. McIntosh, B.M., et al. 1962. S. Afr. J. Med. Sci. 27:77-86.
10. Rapport Annuel de l'Institut Pasteur de Dakar. 1980.
11. Cornet, M., et al. 1979. Cah. ORSTOM Ent. Med. Parasitol. 17:149-164.

Remarks
