

Virus Name: Ingwavuma		Abbreviation: INGV
Status Arbovirus	Select Agent No	SALS Level 2
SALS Basis Results of SALS surveys and information from the Catalogue.		
Other Information		
Antigenic Group Simbu		

SECTION I - Full Virus Name and Prototype Number

Prototype Strain Number / Designation SAAn 4165	Accession Number	Original Date Submitted 3/2/1984
Family Bunyaviridae	Genus Bunyavirus	
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) B.M. McIntosh, et al. (1)	Isolated at Institute S. Afr. Inst. Med. Res., Johannesburg	
Host Genus Hyphanturgus ocularius (weaver-bird)	Species	Host Age/Stage Adult
Sex Not Answered		
<u>Isolated From</u>	<u>Isolation Details</u>	
Organs/Tissues	Liver, spleen, kidney	
Signs and Symptoms of Illness	Arthropod	
Time Held Alive before Inoculation		
Collection Method Mist nest	Collection Date 5/15/1959	
Place Collected (Minimum of City, State, Country) Ingwavuma River, Ndumu, South Africa		
Latitude 27° 0' S	Longitude 32° 0' E	
Macrohabitat Tropical, coastal lowland	Microhabitat Riverine forest	Method of Storage until Inoculated Solid CO2
Footnotes		

Section III - Method of Isolation

Inoculation Date
5/22/1959

Animal (Details will be in Section 6)
nb mice

Route Inoculated
Intracerebral

Reisolation
No

Other Reasons

Another strain isolated in 1962 from Culex neavei at same locality; reisolation successful

Homologous Antibody Formation by Source Animal
No

Test(s) Used
CF, NT

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 3.7 dex	Control Titer 6.8 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

5.8-6.4**6.2**

Temperature Range

Temperature Optimum

Remarks

Serologic Methods Recommended

CF, NT, HI

Footnotes

Antibody or Virus	ING Virus			ING Antibody	
	HI [3]	CF [2] , [3]	NT [4]	CF [2] , [3]	NT [4]
Manzanilla		1	1.9	2	1.4
Oropouche		64	1.8	64	>3.4
Button Willow			1.6		2.5
Mermet			0		2.8
Utinga			1.6		2.9
Aino			>1.0		>4.7
Thimiri	-	>512	0.8	>512	
Simbu	-	>2048	1.7	>512	>3.2
Akabane	-	>512	>3.8	>512	>3.5
Shamonda	-	>1024	>2.8	>512	4.1
Sango	-	>512	>3.5	>512	2.4
Sabo	-	>1024	>2.2	>512	>3.5
Sathuperi	-	>1024	<2.9	>512	>2.8
Shuni	-	>2048	2.6	>512	4.3
Nola	-	>1024		>512	
Ingwavuma	160				

In HI results, - = no inhibition at 1/10 dilution of hyperimmune ascitic fluid; CF results as quotient of homologous/heterologous titers; NT results as difference in log neutralization index from homologous.

By CF also closely related to Mermet [5]

For further CF and immunodiffusion test results with Simbu group viruses see Reference [15].

Regarded as a subtype of Manzanilla virus in the Simbu serogroup [6], [16].

Section VI - Biologic Characteristics

Virus Source (all VERTEBRATE isolates)
Pooled organs (LV), blood (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 +/- (g)
		Day (c)	Extent (d)	Titer TCD50/ml (e)	Day (c)	Size (f)	Titer PFU/ml (e)	
BHK-21 (CL)	SMB 7	2	4+	8.8* (7)				
Vero (CL)					3	2 mm	6.7* (8)	
LLC-MK2 (CL)					3	4 mm	7.4 (8)	
PS (CL)	SMB 7 hamster cells 1	3	4+	5.6	3	2 mm (9)		

* 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		0/242 NT	South Africa (1)
Man		0/490 NT	Thailand (11)
Man		11/260 NT	India (14)
Pigs (blood)	11/28		Thailand (10, 11)
Pigs		18/50	Thailand (11)
Dogs		11/50	
Ducks		4/55	
Chickens		3/50	

Buffalo		4/50	
Cattle		2/50	
Birds:			
Hyphanturgus ocularius	1		South Africa (1)
Hyphanturgus brachypterus + 5 spp.	8		Central African Republic (12)
Plesiositraga cucullatus + other spp.	25		Ibadan, Nigeria (13)
Ardeola grayii	1		India; originally referred to as "Balagodu" virus (14)
Muscicapa striata	1		Cyprus (5)
Culex neavei "univittatus"	1		South Africa (1)
Culex vishnui	1		Thailand (10)
Culex guiarti	1		Cent. Afr. Rep. (12)
Aedes circumluteolus	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 log ₁₀ /ml
Mice (nb)	An 4165	ic	Death	2	9.2
Mice (nb)	Balagodu	ip	Death		8.9
Mice (nb)		sc			
Mice (wn)	An 4165	ic	Death	3-4	7.2
Mice (wn)	Balagodu	ip	Death		7.8
chicks (2 day)		sc			
Macaca radiata		im	No viremia, antibody		
guinea pigs	Balagodu, An 4165	ip, ic	Death sometimes, antibody		

Section IX - Experimental Arthropod Infection and Transmission

Arthropod species & virus source(a)	Method of Infection log ₁₀ /ml (b)		Incubation period (c)		Transmission by bite (d)		Assay of arthropod, log ₁₀ /ml (e)		
	Feeding	Injected	Days	°C	Host	Ratio	Whole	Organ	System
Culex quinquefasciatus; Balagodu virus strain	>5.0		15	30	1-day chicks	1/4	2 pools of 5 mosq. each positive for virus (14)		

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), Nigeria (13), Central African Republic (12), India (14), Thailand (10), Cyprus (5)
Suspected (Antibody only detected)

Section XIII - References

1. McIntosh, B.M., et al. 1965. S. Afr. J. Med. Sci. 30:67-70.
2. Berge, T.O., editor. International Catalogue of Arboviruses Including Certain Other Viruses of Vertebrates. 2nd Ed. U.S. Public Health Service Publication No. 1760. 1975.
3. McIntosh, B.M. Unpublished.
4. Shope, R.E. 1969. Unpublished and Berge, T.O. 1975, quoted by (6).
5. Theiler, M. and Downs, W.G. The Arthropod-borne Viruses of Vertebrates. Yale University Press. 1973. p. 246.
6. Bishop, D.H.L., and Shope, R.E. In: Comprehensive Virology Vol. 14, H. Fraenkel-Conrat and R.R. Wagner, editors. Plenum Press, New York. 1979. pp. 1-156.
7. Karabatsos, N. and Buckley, S.M. 1967. Am. J. Trop. Med. Hyg. 16:99-105.
8. Stim, T.B. 1969. J. Gen. Virol. 5:329-338.
9. Cogate, S.S. 1976. Ind. J. Med. Res. 64:83-86.
10. Top, F.H., et al. 1974. Am. J. Trop. Med. Hyg. 23:251-257.
11. Top, F.H., et al. 1972. Meeting Am. Soc. Trop. Med. Hyg. 9 Nov.
12. Rapport Annuel de l'Institut Pasteur de Dakar. 1980.
13. Causey, O.R., et al. 1972. Ann. Trop. Med. Parasitol. 66:357-362.
14. Pavri, K., et al. Ind. J. Med. Res. 57:758-764.
15. David-West, T.S. 1972. Ind. J. Med. Res. 60:191-199.
16. Kinney, R.M. and Calisher, C.H. 1981. Am. J. Trop. Med. Hyg. 30:1307-1318.

Remarks

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