

<b>Virus Name: Nyando</b>		<b>Abbreviation: NDOV</b>
Status <b>Probable Arbovirus</b>	Select Agent <b>No</b>	SALS Level <b>2</b>
SALS Basis <b>Results of SALS surveys and information from the Catalogue.</b>		
Other Information		
Antigenic Group <b>Nyando</b>		

**SECTION I - Full Virus Name and Prototype Number**

Prototype Strain Number / Designation <b>MP 401</b>	Accession Number	Original Date Submitted <b>2/3/1985</b>
Family <b>Bunyaviridae</b>	Genus <b>Bunyavirus-like</b>	
Information From <b>M.C. Williams and J.P. Woodall</b>	Address <b>E. African Virus Res. Institute, P.O. Box 49, Entebbe, Uganda, E. Africa</b>	
Information Footnote <b>Reviewed by editor</b>		

**Section II - Original Source**

Isolated By (name) <b>Williams, et al. (1)</b>	Isolated at Institute <b>Entebbe</b>	
Host Genus <b>Anopheles funestus, pool of 110 mosquitoes</b>	Species	Host Age/Stage
Sex <b>Female</b>		
<u>Isolated From</u>	<u>Isolation Details</u>	
Signs and Symptoms of Illness	Arthropod	
Time Held Alive before Inoculation		
Collection Method <b>Taken resting inside huts</b>	Collection Date <b>12/16/1959</b>	
Place Collected (Minimum of City, State, Country) <b>Ramulla, near Kisumu, Kenya</b>		
Latitude <b>0° 7' S</b>	Longitude <b>34° 58' E</b>	
Macrohabitat <b>Nyando river valley, flat lakeshore area near fields and swamp(2)</b>	Microhabitat <b>Inside mud huts (3)</b>	Method of Storage until Inoculated <b>Alive for 1-3 days, then at - 20dC</b>
Footnotes		

**Section III - Method of Isolation**

Inoculation Date  
**12/21/1959**

Animal (Details will be in Section 6)  
**nb mice**

Route Inoculated  
**ic, ip and sc**

Reisolation  
**No**

Other Reasons  
**Unrelated to any virus in the laboratory**

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)	

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**Stability of Infectivity (effects)**

pH (infective range)

Lipid Solvent (ether - % used to test) <b>1:1</b>	After Treatment Titer <b>&lt;2.8 dex</b>	Control Titer <b>5.0 dex</b>
Lipid Solvent (chloroform)	After Treatment Titer	Control Titer
Lipid Solvent (deoxycholate)	After Treatment Titer	Control Titer
Other (formalin, radiation)		

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**Virion Morphology**

Shape <b>Bunyavirus-like particles (10)</b>	Dimensions	
Mean nm	Range nm	
Measurement Method <b>Electron microscopy (10)</b>	Surface Projections/Envelope	Nucleocapsid Dimensions, Symmetry

**Morphogenesis**

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

Hemagglutination <b>Yes</b>	Antigen Source <b>SMB ext. by fluorocarbon (Arcton 113) + prot.</b>	Erythrocytes (species used) <b>Goose</b>
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pH Range <b>5.8-6.2</b>	pH Optimum <b>5.8-6.1</b>
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Temperature Range <b>Only RT and 4dC tested.</b>	Temperature Optimum
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Remarks  
**Antigen is very labile. Sucrose-acetone extraction failed.**

Serologic Methods Recommended  
**CF, NT**

Footnotes  
**Antigen is very labile. Sucrose-acetone extraction failed.**

- HA: (a) No inhibition by antisera to Semliki Forest, chikungunya, Sindbis, WN, Ntaya, Bunyamwera or Pongola.
- (b) MP 401 antiserum did not inhibit the following antigens: EEE, WEE, VEE, Mayaro, chikungunya, Semliki Forest, Sindbis, Middelburg, Aura, Getah, Bebaru; YF, Wesselsbron, Zika, Banzi, Spondweni, West Nile, dengue 2, MVE, Ntaya, RSSE, Powassan, SLE, JBE; Ilesha, Bunyamwera, Germiston, Marituba, Oriboca, Caraparu, Tahyna, California, Bwamba, Sathuperi, SF Sicily, SF Naples, Akabane, Witwatersrand, Delcainie, Bakau, Ketapang, Manzanilla, Koongol, Bhanja, Ingwavuma. (The information in the subsection (b) above is from Dr. J. Casals, Rockefeller Foundation Virus Laboratories, New York.)

CF: No reaction in cross testing with Bwamba, Pongola, Simbu, Ingwavuma, African horsesickness, Wad Medani, bluetongue, Chenuda, Lagos bat, Lumbo, Mossuril, Nairobi sheep disease, Nyamanini, Quarafil, Thogoto, Witwatersrand. For homologous titres see Reference [1].

Sera	Antigen		
	MP 401	ERET 124	ERET 147
MP 401	40/512 **	ND	20/128
ERET 124	ND	40/128	40/128
ERET 147	20/256	80/256	80/256

\*\* Serum titre/antigen titre

ERET 124, 147: Strains isolated from Eretmapodites mosquitoes in Ethiopia by Dr. C. Serie.

NT: No protection by antisera to chikungunya, o'nyong-nyong, Semliki Forest, Sindbis, Middelburg, dengue 1 and 2, Entebbe bat, Spondweni, Wesselsbron, West Nile, Uganda S, YF, Ntaya, Zika, Apeu, Oriboca, Bunyamwera, Germiston, Ilesha, Simbu, Semunya, Nakiwogo, Rift Valley fever, Nairobi sheep disease, Witwatersrand, Bwamba, Pongola, EMC, Theiler's FA, or GD7.

In NT, Nyando virus was distinct in both directions from both of the Eretmapodites isolates.

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)	
Jungle fowl embryo (PC)	P-8				5	Plaques	>1.3 (a)	
Duck embryo (PC)						No plaques(9)		
Vero (CL)	P-5				5	2 mm	6.6 (11)	
LLC-MK2 (CL)					6	2 mm	7.0 (11)	

(a) Expressed in dex

Vertebrate (species and organ) and arthropod	No. isolations/No. tested	No. with antibody/No. tested Test used	Country and region
Man	1 *		Central African Republic (4, 8)
Man		34/89 NT	Kenya (1)
Man		11/39 NT	Uganda (1)
Anopheles funestus	1/2,130		Kenya (1)
An funestus	1		Central African Republic (4)
Aedes dalzieli	3		Kedougou, Senegal (12)

\* Patient with biphasic fever, myalgia, vomiting

**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 <sub>10</sub> /ml
Mice (nb)	P-3	ic 0.01	Death	5	>3.5
Mice (nb)	P-9	ip			
Mice (nb)		sc			
Mice (wn)		ic 0.03	Antibody		
Mice (wn)		ip 0.2	Antibody		
Mice (nb)		ic 0.01	Death	4	6.5
Mice	P-1, P-21	ic,ip,sc 0.5	Only alopecia and runting, no deaths		

**Section IX - Experimental Arthropod Infection and Transmission**

Arthropod species & virus source(a)	Method of Infection log <sub>10</sub> /ml (b)		Incubation period (c)		Transmission by bite (d)		Assay of arthropod, log <sub>10</sub> /ml (e)		
	Feeding	Injected	Days	°C	Host	Ratio	Whole	Organ	System
Aedes aegypti	Virus multiplied to titer of 3.5 dex after parenteral inoculation, but attempts to transmit by bite were unsuccessful (7).								

**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 <b>One</b>	Category (i.e. febrile illness, etc.)	

**Section XII - Geographic Distribution**

Known (Virus detected) <b>Kenya, Central African Republic, Senegal</b>
Suspected (Antibody only detected) <b>Uganda</b>

**Section XIII - References**

<ol style="list-style-type: none"><li>1. Williams, M.C., et al. 1965. Arch. ges. Virusforsch. 15:422-427.</li><li>2. Haddow, A.J. 1942. Bull. Ent. Res. 33:91.</li><li>3. Corbet, P.S., et al. 1961. Trans. R. Soc. Trop. Med. Hyg. 55:463-480.</li><li>4. Rapport Annuel de l'Institut Pasteur de Bangui. 1969. p. 37.</li><li>5. Stim, T.B. 1969. J. Gen. Virol. 5:329-338.</li><li>6. Ardoin, P.L.M. and Simpson, D.I.H. 1965. Bull. Soc. Path. Exot. 58:573-589.</li><li>7. E. Afr. Virus Res. Inst. Annual Rep. 1964. No. 14. p. 51.</li><li>8. Digoutte, J.P., et al. 1972. Bull. Soc. Path. Exot. 65:751-758.</li><li>9. Lazuick, J. Personal communication. 1979.</li><li>10. Harrison, A., et al. Personal communication. 1981.</li><li>11. Stim, T.B. 1969. J. Gen. Virol. 5:329-338.</li><li>12. Rapport Annuel de l'Institut de Dakar. 1975. p 11.</li></ol>
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**Remarks**

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