Virus Name: **Kotonkan** **Abbreviation:** **KOTV**

Status: Probable Arbovirus **Select Agent:**
SALS Level: 2 **SALS Basis:** S **HEPA Filtration:**
Antigenic Group: rabies serogroup
Taxonomic status:
Other Information: None.

Section I - Full Virus Name and Prototype Number

Full Virus Name: **Prototype Number:**
Kotonkan IbAr 23380
Information from: G.E. Kemp and N. Karabatsos **Date:**
* 9/19/1984
Address: Division of Vector-Borne Viral Diseases, CDC, Fort Collns, Colorado 80522 USA
*
Revised

Section II - Original Source

Isolated by: Dr. Vernon Lee **at:** Ibadan, Nigeria
Genus and species: Culicoides spp., pool of approximately 2508 (1, 2) **Sentinel** X
Age/Stage: **Sex:**

Isolated From	Isolation detail

Signs and symptoms of illness:
Arthropod engorged **depleted** **gravid**
Time held alive before inoculation: less than 8 hours
Collection date: 12/11/1967 **Method:** light trap
Place collected: University of Ibadan
Latitude: 7° 23’ ” N **Longitude:** 3° 56’ ” E
Macrohabitat: grass pasture, derived from clearing high tropical forest
Microhabitat: cattle barns
Method of storage until inoculated: -60dF in mechanical freezer
Footnotes:

Section III - Method of Isolation and Validity

Inoculation Date: 12/14/1967
Animal: nb mice **Embryonated egg:** **Tissue Culture:**
(Details in Section VI - Biologic Char.)
Route inoculated: intracerebral **Reisolation:** Not tried
Other reasons:
Homologous antibody formation by *source animal* (See Section II):
Test used: HI **CF** **NT**
Other:
Footnotes:

Section IV - Virus Properties

Physicochemical:
RNA: **DNA:** **Single Strand:** **Double Strand:**
Pieces: **Infectivity:** **Sedimentation coefficient(s): /strong>**
Percentage wt. of virion protein **, lipid** **carbohydrate**
Virion polypeptides:
Number: **Details:**
Non-virion polypeptides:
Number: **Details:**
Virion density:
Sedimentation coefficient:
Nucleocapsid density **Sedimentation coefficient:**

Stability of infectivity **(effects) pH**
Lipid solvent:
(ether) **After treatment titer** **Control titer**
(chloroform) 10% **After treatment titer** 2.5 dex **Control titer** 4.4 dex
Detergent:
(deoxycholate) **After treatment titer** **Control titer**
Other (formalin, radiation):

Virion morphology:
Shapeconical and parallel-sided, bullet-0shaped virus p**Dimensions**
Mean (nm) 195x68 (2) **range (nm)** **how meansured** thin-section electron microscopy (2)
Surface projections, envelope surface projections; membranous envelope
Nucleocapsid dimensions, symmetry cross-striations of nucleocapsid helix

Morphogenesis:
Site of constituent formation in cell budding from plasma membrane (2, 3)
Site of virion assembly viral matrix or inclusion material in cytoplasm (2, 3)
Inclusion bodies
Other

Hemaggiutination:
HemaggiutinationNot tried **Antigen source**
Erthrocytes **pH range** **pH optimum**
Temperature optimum **range**
Remarks
Serologic methods recommended CF, serum dilution NT in nb mice * Mixed pool c
Footnotes:

Section V - Antigenic Relationship And Lack of Relationship To Other Viruses

In CF tests done at Ibadan, a kotonkan virus antigen reacted with immune mouse ascitic fluid for Mokola virus of the rabies serogroup but not with nine arbovirus multivalent sera nor with monovalent immune fluids prepared with 64 distinct agents, including rabies, Lagos bat, Chandipura, bluetongue, Ibadan isolates of the epizootic hemorrhagic disease of deer group, IbAr 23388 (Abadina), herpesvirus, Newcastle disease and vaccinia. Following the isolation and identification of bovine ephemeral fever (BEF) virus in Nigeria, kotonkan virus was tested for CF reactions with this agent. Kotonkan hyperimmune mouse ascitic fluid with homologous titer of 1:32 failed to react at the 1:4 dilution with BEF mouse brain antigen; BEF hyperimmune mouse ascitic fluid (homologous titer 1:64) did not react at the 1:4 dilution with kotokan antigen [2] .
In cross-CF tests done at the Yale Arbovirus Research Unit, kotonkan virus again reacted with Mokola but not with rabies, Lagos bat, Obodhiang or 191 other viruses. Indirect FA tests, done at the Centers for Disease Control, confirmed the CF relationship between kotonkan and Mokola [2] , [3] . In N tests, however, kotonkan virus failed to react with Mokola and other rhabdoviruses [2] .

Cross-complement-fixation tests with kotokan and rabies serogroup viruses [2]						**Neutralization tests with kotokan and other rhabdoviruses [2]**						
	Mouse ascitic fluid CF antibody to:					**Mouse ascitic fluid NT antibody to:**						
Virus or Antigen	**Kotonkan**	**Mokola**	**Rabies CVS**	**Lagos bat**	**Obodhiang**	**Kotonkan**	**Mokola**	**Rabies [b] CVS**	**Lagos bat**	**CHP**	**BEF Afr [c]/ Aust [c]**	
Kotokan	64 [**]	32	0	0	0	2.9 [a]	0.2	1.0	0.6	0.4	0.4	0.4
Mokola	0	256	32	4	16	0.0	3.1	0.9	2.6			
Rabies, CVS	0	64	256	0	0	0.0	0.2	3.0	0.2			
Lagos Bat	0	128	16	32	8	0.0	0.1	0.1	2.0			
Obodhiang	0	4	0	0	128							
191 arbo- viruses and other viruses of vertebrate	0	0	0	0	0							

[**] ascitic fluid titer; o = <4

[a] LNI expressed in dex

[b] Horse serum supplied by Lederle Labs.

[c] Supplied by Veterinary Res. Lab., Onderstepoort, South Africa.

Section VI - Biologic Characteristics

Virus source (all VERTEBRATE isolates):
Lab Methods of Virus Recovery (ALL ISOLATIONS): Newborn mice
Susceptibility of Cell Culture Systems:

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)	
Aedes albopictus (CL)	MB 9							+(4)	
Vero (CL)	MB 9 AA 1	7-10	3+(5)		6	2mm (4)			
BHK-21 (CL)		7-10	3+(4)						
CER (CL)	CER 4			4.0-5.0^d (6)					
BHK-21 (CL)								-(9)	
Vero (CL)		4-5	CPE	5.8 (9)					
E6 (CL)		5-6	+-CPE	4.5 (9)					
C6/36 (CL)		3	No CPE	3.8 (9)				+(9)	

NOTE: Original Vero or BHK-21 cell culture passage was co-cultivated with infected Ae albopictus cells (4, 5).

D Expressed in dex

Section VII - Natural Host Range

Vertebrate (species and organ) and arthropod	No. isolations/No. tested	No. with antibody/No. tested Test used	Country and region
Culicoides spp. *	1/72 (14,500 insects		University dairy barn, Ibadan, Nigeria (1, 2)
			Northern Nigeria (2)
Man		2/39 NT	Jos
Trade cattle		124/128 NT	(Northern origin)
Dairy cattle		29/29 NT	Vom
Horses		0/2 NT	
Cattle egret, Bubulcus ibis		1/1 NT	Bassa
Hedgehog, Atelerix albiventris		14/15 NT	
Giant rat, Cricetomys gambianus		14/21 NT	
Other rodents		1/2 NT	
Other rodents		0/2 NT	Fika
			Southern Nigeria (2)
Man		0/87 NT	South Nigeria
Monkey		0/1 NT	University of Ibadan
Swine		0/50 NT	
Sheep		8/75 NT	
Cattle		24/25 NT	
Chickens		0/16 NT	

Horses		2/33 NT	Ibadan
Wild birds		0/41 NT	
Shrew, Crocidura sp.		0/48 NT	University of Ibadan
Rodents		0/43 NT	
Bats		0/23 NT	

* In typical light trap catches during this period, the most abundant species was C. pallidipennis.

Section VIII - Susceptibility To Experimental Infection (Record Viremia)

Experimental host and age	Passage history and strain	Inoculation Route-Dose	Evidence of infection	AST (days)	Titer log10/ml	
mice (nb)	IbAr 23380, MB 0	ic	1/8 dead, 1/8 sick (2)	11		
mice (nb)		ip				
mice (nb)		sc				
mice (wn)		ic				
mice (wn)		ip				
mice (nb)	IbAr 23380, MB 9	ic	illness, death (2)	14		
Fulani calves, white (3 mo)	IbAr 23380, MB 3	sc, intradermal	1/2 developed mild clinical illness similar in many respects to that caused by bovine ephermal fever virus. Viremia not detected during 15 days post-inoculation. Both calves developed NT antibody following infection (7).			

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
Ae. aegypti, An quadrimaculatus, Cx quinquefasciatus, Er chrysogaster, 30 ea., innoc. with 10% mouse brain kotokan virus (IbAr 23380), P-8, titer 5.4 dex LD50/ml., 0.0006 ml/mosq. Every 14 days 5 paris sal. glands (1 ml dil.) passed to 30 clean mosqs. and inoc. ic baby mice; virus confirmed by CF. Kotokan pass. 5 times Ae and virus recovered to 72 days, An 4 times to 58 days, Cx 2 times to 30 days, Er 16 days. Mosq. virus not transmitted by bite to baby mice infect. sc with sal. gland virus. Low level viremia baby mice 3-5 days pi (ic) (8).									

Section X - Histopathology

Character of lesions:
Inclusion bodies:
Cytoplasmic:(M) (LV) Intranuclear: (M) (LV)
Organs-tissues affected:
Category of tropism:

Section XI - Human Disease

Human disease: **In nature:** **(S) (R)**
Death: **(S) (R)**
Residua: **(S) (R)**
Laboratory infections: **Subclinical:** **(S) (R)**
Overt Disease: **(S) (R)**
Clinical manifestations:
Category: **No. of cases:**

Section XII - Geographic Distribution

Section XIII - References

1. Lee, V.H. 1979. J. Med. Ent. 16:76-79.
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6. Smith, A.L., et al. 1977. Intervirology 8:92-99.
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Section XIV - Remarks

Kotokan is a Yorubu word for Culicoides fly; its literal translation is "as next to nothing."