Virus Name: Akabane	Abbreviation: AKAV

Status
Probable Arbovirus

Select Agent
No

SALS Level
3

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

Other Information
USDA Permit Required, Hepa Filtration, USDA Restricted, USDA High Consequence Agent

Antigenic Group
Simbu

SECTION I - Full Virus Name and Prototype Number

Prototype Strain Number / Designation
JaGAr 39

Accession Number

Original Date Submitted
2/14/1985

Family
Bunyaviridae

Genus
Bunyavirus

Information From
Akira Oya

Address
Dept. of Virology and Rickettsiology, Natl. Inst. of Health, Shinagawa, Tokoyo

Information Footnote
Reviewed by editor

Section II - Original Source

Isolated By (name)
A. Oya, et al. (1,2)

Isolated at Institute
Gumma, Japan

Host Genus
Aedes vexans nipponii, Theobald

Species

Host Age/Stage

Sex
Not Answered

Isolated From

Isolation Details

Signs and Symptoms of Illness

Arthropod

Time Held Alive before Inoculation

Collection Method
Caught by aspirator

Collection Date
8/20/1959

Place Collected (Minimum of City, State, Country)
Akabane Town, Gumma Prefecture, Japan

Latitude
36° 13' N

Longitude
139° 34' E

Macrohabitat
Rural Kanto plain

Microhabitat
Livestock pens, ground level; well irrigated rice field area

Method of Storage until Inoculated
Stored in dry ice chest

Footnotes

Section III - Method of Isolation

Inoculation Date
9/1/1959

Animal (Details will be in Section 6)
nb mice

Route Inoculated
Intracerebral

Reisolation
Not tried

Other Reasons
Not tried. Five other strains were isolated from five different places in Gumma Prefecture during 20 to 27 August, 1959.

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) **0.1%**	After Treatment Titer **<2.7 dex**	Control Titer **3.6 dex**

Other (formalin, radiation)
Infective particle in 10% SMB not precipitated by 2.5 mg/ml prot. sulfate

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

Hemaggiutination	Antigen Source	Erythrocytes (species used)
Yes	**SMB ext. by sucrose-acetone**	**Goose**
pH Range	pH Optimum	
6.0-6.2	**6.1**	
Temperature Range	Temperature Optimum	
37dC		

Remarks
Limiting dilution passage was applied in order to obtain good HA yielder

Serologic Methods Recommended
CF, HI, NT *Infective titer does not decrease s

Footnotes
Limiting dilution passage was applied in order to obtain good HA yielder

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

A. **Simbu , Oropouche and Sathuperi viruses were found to share antigens with Akabane in CF [4] .**

AKABANE (JaGAr 39) immune mouse	Antigens of Simbu (SAAr 53)	Oropouche (Tr 9760)	Sathuperi (IG 11155)	AKABANE (JaGAr 39) Antigen	Immune Serum of Simbu (SAAr 53)	Oropouche (Tr 9760)	Sathuperi (IG 11155)
serum	16/128 *	8/128	32/128		16/64 *	0/64	64/256+

* Ht/Ho in CF

B. Viruses demonstrated to be immunologically unrelated [2] , [3] , [4] .

HI:	Group A:	Getah , Sagiyama , Sindbis , Bebaru , chikungunya , BaH 306, Mayaro (Uruma)
	Group B:	JE (Nakayama), West Nile , RSSE, Negishi , Powassan , Modoc , dengue 1 , YF-17D
	Group C:	Marituba , Oriboca , Apeu
	Bunyamwera:	Batai , Cache Valley , Bunyamwera , Wyeomyia , Germiston
	Others:	California encephalitis , Witwatersrand, Ketapang, Nodamura , Guaroa , Kairi , Guama, Catu, Bwamba, Pongola, Turlock, Umbre, Bakau, SF Sicilian , SF Naples , Anopheles A , Lunyo , Manzanilla , EMC, Colorado tick fever , Tacaiuma, Tahyna
CF:	Group C:	Marituba , Oriboca , Apeu
	Bunyamwera :	Bunyamwera , Batai , Wyeomyia , Germiston
	Others:	Ketapang, California encephalitis , Kairi , Guaroa , Ilesha , Bakau, Tahyna , Junin , Manzanilla , Ingwavuma

SIRACA has classified Akabane virus as a distinct virus type and placed it in the AKA complex [15] .

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
		Day (c)	Extent (d)	Titer TCD50/ml (e)	Day (c)	Size (f)	Titer PFU/ml (e)	+/- (g)
Hamster kidney (PC)	SMB3 HK4	3-4	4+	3.5 **				
Vero (CL)	P-18				8	1mm	4.3 **	
LLC-MK2 (CL)					3	4mm	8.0 (6)	
BHK-21 (CL)			CPE	5.0		Plaques	5.0	

** 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. tsted Test used	Country and region
Man (adults)	None	0/483	Gumma Prefecture, Japan ; 1960
Fetal calves (various tissues)	2 *		Japan (10)
Mosquitoes:			
Aedes vexans nipponii	4/120 pools		Plain area of Gumma Prefecture, Japan
Culex tritaeniorhynchus	2/169 pools		
Culicoides brevitarsis	2		Queensland, Australia ; 1968 (5)
Young bull , apparently healthy (blood)	1	NT antibody 1 mo. after isolation	Australia (11)
Adult cattle		490/2,301 NT	Japan (8)
Calves		52/70NT	

* During epizootic of congenital arthrogryposis-hydranencephaly in cattle

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 1	ic 0.02	Illness and death	2-5	9.7
Mice (nb)		ip			
Mice (nb)		sc			
Mice (wn)		ic 0.03	Illness and death	3-6	8.1
Mice (wn)		ip			
pregnant ewes	SM 3 Cow 1 SM 2		Congenital malformations (arthrogryposis-hydranencephly syndrome) in foetal lambs. NT antibody to AKA in lambs (9).		
bulls			Viremia 2-9 days pi for 3-5 days. NT antibody by 7-10 days. Virus not isol. from semen (13)		
embryonated eggs (4 days)		ys	Death or developmental abnormalities including arthrogryposis (12).		
embryonated eggs (6 days)		ys	Myopathy and encephalopathy (15).		
embryonated eggs (15 days)		iv	Foci of encephalitis including neuronal degeneration (15).		

Section IX - Experimental Arthropod Infection and Transmission

Section X - Histopathology

Character of lesions (specify host)

Inclusion Bodies — Intranuclear

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)
Japan, Australia (5), Kenya (14)

Suspected (Antibody only detected)
HI antibodies were found in pig sera in Taiwan, Viet Nam, Bandung, and in horse sera in Thailand (7)

Section XIII - References

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Remarks