Virus Name: Lokern	Abbreviation: LOKV

Status
Arbovirus

Select Agent
No

SALS Level
2

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

Other Information

Antigenic Group
Bunyamwera

SECTION I - Full Virus Name and Prototype Number

Prototype Strain Number / Designation
FMS 4332

Accession Number

Original Date Submitted
7/20/1984

Family
Bunyaviridae

Genus
Bunyavirus

Information From
Robert P. Scrivani

Address
School of Public Health, University of California, Berkeley, California

Information Footnote
Revised

Section II - Original Source

Isolated By (name)
Robert P. Scrivani

Isolated at Institute
School of Public Health, Berkeley

Host Genus
Culex tarsalis (pool of 50)

Species

Host Age/Stage
Adult

Sex
Female

Isolated From

Isolation Details

Signs and Symptoms of Illness

Arthropod

Time Held Alive before Inoculation

Collection Method
Dry ice baited trap

Collection Date
7/24/1962

Place Collected (Minimum of City, State, Country)
Kern County, California, USA

Latitude
35° 30' N

Longitude
119° 0' W

Macrohabitat
Farmyard

Microhabitat
Outdoors, ground level

Method of Storage until Inoculated
Sealed glass tube at -65dC

Footnotes

Section III - Method of Isolation

Inoculation Date
8/1/1962

Animal (Details will be in Section 6)
(Tissue Culture)

Route Inoculated

Reisolation
Yes

Other Reasons
No similar virus in laboratory

Homologous Antibody Formation by Source Animal

Test(s) Used

Footnotes

Section IV - Virus Properties

Physicochemical
RNA, Single Strand

Pieces (number of genome segments) **3**	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 **2.0 dex**	Control Titer **7.0 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

Hemaggiutination	Antigen Source	Erythrocytes (species used)
Yes	**SMB ext. by sucrose-acetone**	**Goose**
pH Range	pH Optimum	
6.2-6.4	**6.2**	
Temperature Range	Temperature Optimum	
4dC, 22dC, 37dC	**37dC**	

Remarks
Low-titer HA (80-160) enhanced by sonication to 64

Serologic Methods Recommended
HI, CF, NT

Footnotes
Low-titer HA (80-160) enhanced by sonication to 64

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

Type of Immune Fluid	Immune Fluid or Antigen	Lokern Antigen CF [1] Ht/Ho	Lokern Antigen HI [1] Ht/Ho	Lokern Antigen NT [2] Ht/Ho	Lokern antiserum CF [1]	Lokern antiserum HI [1]	Lokern antiserum NT [2]
Hyperimmune mouse serum or ascitic fluid [3]	Lokern	512	640	3.7	512	640	3.7
Cache Valley	32/64	0/80		256	20		
Maguari	16/64	20/320		256	80		
Tlacotalpan	512/512	40/320		128	40		
Tensaw	128/512	20/1280		256	160		
Main Drain	64/128	0/1280	0.3/2.1	256	0	0.0	
Immune hamster serum	Lokern		160	3.8		160	3.8
Cache Valley		20/80	1.4/2.1		0	0.8	
Maguari		20/160	1.9/1.8		20	0.4	
Tensaw		80/640	3.0/2.0		0	0.3	
Main Drain		0/80	0.0/2.5		0	0.0	

[1] CF and HI titers are expressed as the reciprocal of the serum or ascitic fluid dilution.

[2] NT titers are expressed as dex LNI. Tests with hyperimmune sera or ascitic fluids were performed in SM inoculated ic, whereas tests with immune hamster serum were done by plaque reduction in Vero cell cultures.

[3] Reagents and facilities of the Yale Arbovirus Research Unit, New Haven, Connecticut, were made available through the courtesy of Dr. W.G. Downs and Dr. R.E. Shope for conducting HI tests. CF tests were done by Dr. R.E. Shope.

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)			4+	>6.0*					
Vero (CL)			4+	9.5		Plaques	9.5* (2)		
BLN, P-11 (CL)			CPE	5.0 (2)					
BLN, P-25 (CL)			CPE	9.0		Plaques	7.8 (2)		
MDBK (CL)			No CPE	4.5 (2)					
EBTr (CL)			No CPE	3.5		Plaques	<1.0 (2)		
MDGK (CL)			No CPE	4.5 (2)					
SIRC (CL)			No CPE	3.5 (2)					
BHK-21 (CL)						Plaques	7.9		
Ae dorsalis (CL)	SM 2		No CPE					+ (3)	
Cx tarsalis(CL)			No CPE					+ (4)	

* 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		12/1,997 [a]	California, USA

Lepus californicus	5/1,066	294/1,014 HI	
Sylvilagus audubonii	1/601	41/551 HI	Kern Co., California, USA
Ammospermophilus nelsoni	0/1,308	3/1,575 HI	
Citellus beecheyi	0/230	2/269 HI	California, USA
Neotoma sp.		6/135 HI	
Sciurus griseus		2/35 HI	
Other rodentia, chiroptera, carnivora	0/4,489	4/4,982 HI	
Wild birds/sentinel chickens		62/3,894 HI	
Amphibians and reptiles	0/470	0/790 HI	
Equine		138/1,063 HI	
Bovine		35/802 HI	
Ovine		82/784 HI	
Porcine		8/89 HI	
Culex tarsalis	1/158,446		Kern Co., California, USA
Mosq. other than Cx tarsalis	0/58,974		
Culicoides variipenis	23/122,089		
Other Culioides spp. Leptoconops Phlebotomus, Simulium spp.	0/11,689		
Culicoides variipenis	7		Utah, USA (6)
Psorophora signipennis	2		Utah, USA (6)

[a] The 12 reactors were from a group of 937 normal individuals residing in Kern County, California in 1958. The remainder tested were from patients with undiagnosed febrile disease collected from 1961 through 1969 and were in part supplied through the courtesy of Dr. E. Lennette and Dr. R. Emmons of the California State Department of Public Health.

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)	SM 3	ic 0.01	Death	3	8.7
Mice (nb)		ip			
Mice (nb)		sc			
Mice (wn)		ic 0.03	Death	5	
Mice (wn)	SM 10	ip 0.03	Antibody		
L. californicus			Antibody and/or viremia (2)		1.4-2.7 (serum)
S. audubonii			Antibody (2)		
rodentia (P. maniculatus, A. nelsoni, C. beecheyi, D. nitratoides)			None (2)		
birds (finches, sparrows, doves, blackbirds)			None (2)		

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
Cx tarsalis	pledget,6.0		4-20		Viral mult. detected after incubation period (2).				
Aedes nigromaculis	pledget,6.6		21		Viral mult. detected after incubation period (2).				
Aedes melanimon	pledget,6.6		21		Viral mult. detected after incubation period (2).				
Culiseta inornata	pledget,6.0		7-21		Viral mult. detected after incubation period (2).				
Culicoides variipennis	pledget,5.8		12-14		Viral mult. detected after incubation period.				
Anopheles freeborni did not become infected after feeding on a virus-soaked pledget.									

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)
California; Colorado; Texas; Utah (6), USA (6)

Suspected (Antibody only detected)

Section XIII - References

1. Porterfield, J.S., et al. 1975/75. Intervirology 6:13-24.
2. Francy, D.B. Ph.D. Thesis, University of California, Berkeley, 1972.
3. Cahoon, B.E., et al. 1979. J. Med. Ent. 16:104-111.
4. Main, O.M., et al. 1977. J. Med. Ent. 14:107-112.
5. Hunt, A.R., et al. 1979. Am. J. Trop. Med. Hyg. 28:740-749.
6. Crane, G.T., et al. 1983. J. Med. Ent. 20:294-300.
7. Calisher, C.H., et al. 1985. Am. J. Trop. Med. Hyg. Submitted.

Remarks

Additional isolates of Lokern virus have been recovered from Psorophora signipennis and Culicoides collected in Texas and Colorado respectively.