

<b>Virus Name: Montana Myotis leukoencephalitis</b>		<b>Abbreviation: MMLV</b>
Status <b>Not 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>B</b>		

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

Prototype Strain Number / Designation	Accession Number	Original Date Submitted <b>1/31/1985</b>
Family <b>Flaviviridae</b>	Genus <b>Flavivirus</b>	
Information From <b>J. Frederick Bell</b>	Address <b>Rocky Mountain Laboratory, Hamilton, Montana</b>	
Information Footnote <b>Reviewed by editor</b>		

**Section II - Original Source**

Isolated By (name) <b>J. Frederick Bell (1)</b>	Isolated at Institute <b>Rocky Mountain Lab., Hamilton, Mont.</b>	
Host Genus <b>Myotis lucifugus</b>	Species	Host Age/Stage <b>Mature</b>
Sex <b>Female</b>		
<u>Isolated From</u>	<u>Isolation Details</u>	
<b>Other Fluids</b>	<b>Saliva - bite</b>	
Signs and Symptoms of Illness <b>Ruffled fur, paresis</b>	Arthropod	
Time Held Alive before Inoculation		
Collection Method <b>By hand</b>	Collection Date <b>7/29/1958</b>	
Place Collected (Minimum of City, State, Country) <b>Farm dwelling, near Florence, Ravalli County, MT</b>		
Latitude <b>46° 37' N</b>	Longitude <b>114° 5' W</b>	
Macrohabitat <b>Valley floor; irrigated farms, elevation 3500, Western Montana</b>	Microhabitat <b>Attic of house</b>	Method of Storage until Inoculated
Footnotes		

**Section III - Method of Isolation**

Inoculation Date  
**7/30/1958**

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

Route Inoculated <b>Intramuscular by bite</b>	Reisolation <b>No</b>
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Other Reasons  
**Subsequent isolations from other individuals of same species, bite and other**

Homologous Antibody Formation by Source Animal  
**Not tested**

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)	After Treatment Titer	Control Titer

Other (formalin, radiation)  
**Chloroform-labile (4 dex decrease) Feldman and Wang, 1961**

**Virion Morphology**

Shape	Dimensions <b>&lt;100 nm</b>	
Mean nm	Range nm	
Measurement Method <b>Passage through 100 nm Gradacol</b>	Surface Projections/Envelope	Nucleocapsid Dimensions, Symmetry

**Morphogenesis**

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

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**Hemagglutination**

Hemagglutination <b>Yes</b>	Antigen Source <b>SMB ext. by acetone-ether; sucrose-acetone + - prot.</b>	Erythrocytes (species used) <b>Chick</b>
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pH Range	pH Optimum <b>6.0</b>
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Temperature Range	Temperature Optimum <b>22dC</b>
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Remarks  
**Low titer (80) by sucrose-acetone method (others not suitable)**

Serologic Methods Recommended  
**CF, HI, and NT**

Footnotes  
**Low titer (80) by sucrose-acetone method (others not suitable)**

1. HI. In the HI test, MML hyperimmune mouse serum inhibited Ilheus, St. Louis (Parton) and Powassan (791-A) of group B in low dilution only, but did not inhibit group A antigens WEE and EEE. No others tested.

2. CF		Antiserum	Antigen
a.	Reaction	MML	Ilheus
	No reaction	MML	WEE
	No reaction	MML	Turlock
	Reaction	MML	ENT
	Reaction	MML	St. Louis
	No reaction	Ilheus	MML
	No reaction	Turlock	
	No reaction	Trivittatus	
	No reaction	Powassan	
	No reaction	Tacaribe	
	No reaction	EBSG	
	No reaction	Modoc	

Sera that did not react at 1:4 dilution in CF test with 1:16 dilution (1 unit) of MML antigen are as follows: Anopheles A, Anopheles B, Rio Bravo (Burns bat), bluetongue, Bunyamwera, Bwamba, California encephalitis, chikungunya, Colorado tick fever (Florio), Culiseta inornata, Cache Valley, dengue 1, dengue 2, dengue 4, EEE, o'nyong-nyong, Herpes, Ilheus, Itaqui, normal mouse, Microtus KF 11, Microtus KF 23, LCM, Mayaro, mouse polio GD 7, Ntaya, Quarantfil, RSSE, Sandfly fever, Semliki Forest, Sindbis, Chenuda, Nyamanini (Ar 1304), Uganda S, WEE, HJ, West Nile, YF 17D, Wyeomyia, Zika.

3. Serum neut. tests. Ilheus, Powassan, ENT sera neutralized only small amount of MML virus. Reverse reaction did not occur.

Antisera vs. fixed rabies (PV-1), Rio Bravo, LCM and 2 strains of mouse poliovirus did not neutralize MML virus.

Two separate cross-neutralization studies, involving 42 and 65 flaviviruses respectively, have shown that MML virus is not closely related to any of the other flaviviruses, and thus cannot be placed in a complex or subgroup [5], [6].

## 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 +/- (g)
		Day (c)	Extent (d)	Titer TCD50/ml (e)	Day (c)	Size (f)	Titer PFU/ml (e)	
Vero (CL)	P-12				13	1 mm	4.8* (3)	
LLC-MK2 (CL)					7	2 mm	7.6 (3)	
BHK-21 (CL)	MB 9	3-4		8.3* (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
Little brown bat ( <i>Myotis lucifugus</i> )	14/142		Ravalli County, Western Montana, USA
Man		0/26 NT	Western Montana
Man		1/476 HI	Connecticut, 1966(2)
Bovines		0/200 HI	
Crows		0/54 HI	
Small mammals		0/235 HI	

Experimental host and age	Passage history and strain	Inoculation Route-Dose	Evidence of infection	AST (days)	Titer log <sub>10</sub> /ml
Mice (nb)	MB 6	ic 0.03	Paresis and death	7	
Mice (nb)		ip 0.1	Paresis and death	8	
Mice (nb)		sc			
Mice (wn)		ic 0.03	Paresis and death	7	
Mice (wn)		ip 0.1	Negative		
Mice (9 day)		ip 0.1	Paresis and death	6	
Mice (13 day)		ip 0.1	Paresis	7	
Mice (17 day)		ip 0.1	Negative		
hamster (ad)		ic 0.03	Negative		
rabbits (ad)		ic 0.1	Negative		
cavies (ad)		ic 0.03	Paresis and death	7	
Myotis lucifugus (ad)		ic 0.3	Paresis	8	6
Eptesicus fuscus (ad)		ic 0.03	Paresis	12	
Chick embryos (8 day)		am.s.	Death	6	

**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

**Section X - Histopathology**

Character of lesions (specify host)

**Mice: leukoencephalitis**

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)

**Montana**

Suspected (Antibody only detected)

**Unknown**

**Section XIII - References**

1. Bell, J.F. and Thomas, L.A. 1964. *Am. J. Trop. Med. Hyg.* 13:607-612.
2. Shope, R.E. Personal communication. 26 March 1971.
3. Stim, T.B. 1969. *J. Gen. Virol.* 5:329-338.
4. Karabatsos, N. and Buckley, S.M. 1967. *Am. J. Trop. Med. Hyg.* 16:99-105.
5. De Madrid, A.T. and Porterfield, J.S. 1974. *J. Gen. Virol.* 23:91-96.
6. Calisher, C.H., et al. Personal communication. 1983.

**Remarks**