Virus Name: Snowshoe hare	Abbreviation: SSHV

Status
Arbovirus

Select Agent
No

SALS Level
2

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

Other Information

Antigenic Group
California

SECTION I - Full Virus Name and Prototype Number

Prototype Strain Number / Designation
Original

Accession Number

Original Date Submitted
8/30/1984

Family
Bunyaviridae

Genus
Bunyavirus

Information From
Donald M. McLean, M.D.

Address
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Information Footnote
Reviewed by editor

Section II - Original Source

Isolated By (name)
W. Burgdorfer, et al. (1)

Isolated at Institute
RML, Hamilton, Montana, USA

Host Genus
Lepus americanus (snowshoe hare)

Species

Host Age/Stage

Sex
Not Answered

Isolated From	Isolation Details
Whole Blood	

Signs and Symptoms of Illness
None

Arthropod

Time Held Alive before Inoculation

Collection Method
Trap

Collection Date
8/1/1959

Place Collected (Minimum of City, State, Country)
Bitterroot Valley, Montana, USA

Latitude
46° N

Longitude
114° W

Macrohabitat
Canyon in Bitterroot National Forest

Microhabitat
Grassy slope near conifers

Method of Storage until Inoculated
-70dC (dry ice; portable storage chest in the field)

Footnotes

Section III - Method of Isolation

Inoculation Date

Animal (Details will be in Section 6)
nb mice

Route Inoculated

Reisolation
Not tried

Other Reasons

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) **1:2**	After Treatment Titer **nil**	Control Titer **>3.0 dex**
Lipid Solvent (chloroform)	After Treatment Titer	Control Titer
Lipid Solvent (deoxycholate) **1:1000**	After Treatment Titer **nil**	Control Titer **3.0 dex**

Other (formalin, radiation)

Virion Morphology

Shape **Spherical**	Dimensions **90-100 nm diameter (19)**	
Mean nm	Range nm	
Measurement Method **Electron microscopy**	Surface Projections/Envelope **Enveloped 5-7 nm thick**	Nucleocapsid Dimensions, Symmetry

Morphogenesis

Site of Constituent Formation in Cell	Site of Virion Assembly	Site of Virion Accumulation
Budding into intracytoplasmic vacuoles (Golgi cisternae)	**Cytoplasm**	**Cytoplasmic vacuoles**

Inclusion Bodies

Other

Hemagglutination

Hemaggiutination	Antigen Source	Erythrocytes (species used)
Yes	**SMB ext. by sucrose-acetone**	**Goose**

pH Range	pH Optimum
6.0-7.0	**6.0**

Temperature Range	Temperature Optimum
	4dC

Remarks
Many isolated do produce hemagglutinin * Prototype strain

Serologic Methods Recommended
NT, CF, HI, gel immunodiffusion

Footnotes
Many isolated do produce hemagglutinin * Prototype strain

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

Neutralization (weaned mice ic) [2]				Hemagglutination inhibition [2]			
	Antiserum				Antiserum		
Virus	SSH	LAC	CE	Antigen	SSH	LAC	CE
SSH	5.5 [a]	4.2	4.3	SSH	1280	320	80
LAC	3.4	4.0	3.0	LAC	320	640	80
CE	2.0	3.9	3.7	CE	640	320	320

[a] Neutralization index in dex.

Complement fixation [2]												
	Antiserum [b]											
Antigen	CE	SSH	LAC	TVT	KEY	JS	SA	JC	TAH	LUM	MEL	GRO
CE	128	32	16	4	16	32	32	8	32	64	16	0
SSH	64	256	32	8	64	32	32	8	64	128	16	0

LAC	32	64	64	8	64	32	16	8	32	32	8	0
TVT	8	16	4	128	16	16	8	0	16	16	8	0
KEY	64	32	16	16	128	64	32	16	64	64	64	0
JS	32	16	8	4	32	256	16	16	32	32	16	0
SA	32	32	8	0	8	32	64	4	32	32	8	0
JC	32	16	16	4	32	32	16	64	16	32	16	0
TAH	32	128	16	0	64	32	32	4	256	128	8	0
LUM	32	64	8	0	32	32	16	4	64	128	8	0
MEL	32	16	8	0	32	64	16	4	16	64	256	0
GRO	0	0	0	0		0	0	0	0	0	0	256

[b] Antiserum titer in presence of optimal dilution of antigen; multiple injection mouse antiserum.

Plaque reduction neutralization [3]

Virus	Antiserum				
	CE	SSH	JC	LAC	KEY
CE	10240 [c]	2560	80	2560	40
SSH	320	20480	160	2560	10
JC	320	160	20480	1280	20
LAC	40	1280	<10	1280	10
KEY	20	80	20	20	160

[c] Reciprocal of serum dilution giving 90% reduction.

SIRACA considers snowshoe hare virus to be a variety of La Crosse virus.

Section VI - Biologic Characteristics

Virus Source (all VERTEBRATE isolates)
Blood (M) (LV)

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)	
Vero (CL)	SMB 1-3	3-5	complete	5.0-6.0(d)	7	1-3 mm	5.0-6.0 (d)		
BHK-21 (CL)	SMB 0-3	2-5	complete	5.0-6.0	5	1-3 mm	5.0-6.0		

(d) 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

Mosquitoes - BRITISH COLUMBIA, CANADA: Aedes canadensis 1/300 (4); A. fitchii 1/8 (5). YUKON TERR., CANADA: A. canadensis 1/496 (8); A. cinereus 1/1,179 (8); A. communis 1/1,765 (8); Culiseta inornata 1/1,778 (8). ALBERTA, CANADA: A. communis 1/2,000 (9); A. stimulans 1/3,032 (9). SASKATCHEWAN, CANADA: A. excrucians 1/201 (12); A. fitchii 1/3,072 (12); A. punctor 1/328 (12) A. cataphylla 1/313 (12). NORTHWEST TERR., CANADA: A. hexodontus 4/4,757 (14). ALASKA, USA: 48 isolations from A. cinereus (16); A. communis (16); A. excrucians (16); A. fitchii (16); A. intrudens (16); A. punctor (16). NEW YORK, USA: A. cinereus 1/580 (17). MONTANA, USA: A. fitchii 5/7,592 (18); Cs. impatiens 1/4,763 (18). MANITOBA, CANADA: A. communis 1/60 (27).

Black fly - ALASKA: Simulium malysceri, 1 (14).

Vertebrate (Virus) - ALBERTA: L. americanus, 1 (10); sentinel rabbit 3/63 (10). ONTARIO: sentinel rabbit 5/9 (13) ALASKA: L. americanus, 18 (14); Dicrostomyx rubicatus (Lemming), 1 (14).

Vertebrate (Antibody)* - BRITISH COLUMBIA: human 48/1,936 (6); L. americanus 20/31 (7). YUKON TERR.: L. americanus 430/1,076 (8); Citellus undulatus 266/3,610 (8). ALBERTA: human 51/160 (11); sentinel rabbit 3/14 (11). ONTARIO: sentinel rabbit 20/29 (13). NORTHWEST ERR.: L. americanus 8/29 (15). ALASKA: sentinel rabbit 11/18 (14). NEW YORK: human 24/159 (17); Marmota monax 21/32 (17); deer 5/15 (17); sentinel rabbit 1/6 (17). MONTANA: L. americanus 5/104 (18); Citellus lateralis 2/60 (18). NOVA SCOTIA: L. americanus 113/1,003 HI, NT (26); horses, 72/861 NT (28); moose, 67.5% (29). NEW BRUNSWICK: deer, 6/129: moose 94/127; horses, 36/204 (30).

* Antibodies by NT

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 5	ic 0.02	Encephalitis and death (1)	2-3	9.0
Mice (nb)	SMB 13	ip 0.05	Encephalitis and death (1)	2-3	
Mice (nb)		sc			
Mice (wn)		ic 0.03	Encephalitis, death, viremia (1)	3-6	
Mice (wn)		ip 0.05	Irregular encephalitis, death(1)	7-10	4.0
hamsters (nb)		ic or ip 0.03	Encephalitis, death, viremia (1)	3	4.5
rabbits (7 day)		ic or ip 0.03	Symptomless viremia (1)		4.0
chick embryo(6 day)		ys	Death (1)	2-5	7.1
Citellus lateralis (ad)		sc	Symptomless viremia (18)		)
Eutamias amoenus (ad)		sc	Symptomless viremia (18)		)
Lepus americanus (ad)		sc	Symptomless viremia (18)		) 2.0-
Citellus columbianus		sc	Symptomless viremia (18)		) 5.8
Microtus pennsylvanius (ad)		sc	Symptomless viremia (18)		)
Neotoma cinereus (ad)		sc	Symptomless viremia (18)		)

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
Culiseta inornata(5)		2.0	17	27	mouse	2/2		SG 1.7	
Culiseta inornata (19)		2.0	194	-1				SG 2.8	
Culiseta inornata (19)		2.0	59	13				SG 3.0	Virions seen by EM
Aedes cinereus(5)		2.0	15	13	mouse	2/2		SG 2.5	
Aedes canadensis(19)		2.0	7	13,21				TH 4.0	
Aedes communis(19)		2.0	7	13				TH 2.3	
Aedes communis(19)		2.0	10	21				TH 3.3	
Aedes aegypti(20)		2.0	20	28	mouse	1/3		SG 3.5	
Aedes aegypti(20)		2.0	25,26,32	13	mouse	3/3		SG 3.3-3.7	
Aedes aegypti(20)	1.2		27	28	mouse	1/7		SG 3.4	
Aedes aegypti(20)	1.2		28	13	mouse	3/3		SG 3.4	

* Virus source was Yukon 1971 SSH isolate (Marsh Lake 23), SMB 2 (5,8). SG: Salivary gland; TH: thorax.

Section X - Histopathology

Character of lesions (specify host)
Neuronal necrosis, perivascular cuffing, glial knots in mouse

Inclusion Bodies — Intranuclear

Organs/Tissues Affected
Brain

Category of tropism
Neurotropic

Section XI - Human Disease

In Nature	Residual	Death
		Reported
Subclinical	Overt Disease	

Clinical Manifestations
Fever, headache, vomiting (31)

Number of Cases	Category (i.e. febrile illness, etc.)
10/95 seroconversions (21) 3 (32)	**Encephalitis (31)**

Section XII - Geographic Distribution

Known (Virus detected)
Canada: Alberta, British Columbia, Northwest Territories, Ontario, Saskatchewan Manitoba (27), Yukon (22);USA: Alaska, Montana, Wisconsin, New York, Massachusetts (23)China (33)

Suspected (Antibody only detected)

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Remarks