Virus Name: Avalon		Abbreviation: AVAV
Status **Possible Arbovirus**	Select Agent **No**	SALS Level **2**

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

Other Information

Antigenic Group
Sakhalin

SECTION I - Full Virus Name and Prototype Number

Prototype Strain Number / Designation
CanAr 173

Accession Number

Original Date Submitted
7/17/1984

Family
Bunyaviridae

Genus
Nairovirus

Information From
Andrew J. Main

Address
Yale Arbovirus Research Unit, 60 College St. New Haven, CT 06510, USA

Information Footnote
Revised

Section II - Original Source

Isolated By (name)
A.J. Main (1)

Isolated at Institute
YARU

Host Genus
Ixodes uriae (=Ixodes putus)

Species

Host Age/Stage
Adult

Sex
Female

Isolated From

Isolation Details

Signs and Symptoms of Illness

Arthropod
Engorged

Time Held Alive before Inoculation
11days

Collection Method
By hand

Collection Date
7/31/1972

Place Collected (Minimum of City, State, Country)
Great Island, Newfoundland, Canada

Latitude
47° 11' N

Longitude
52° 46' W

Macrohabitat
Rocky island

Microhabitat
Herring gull (Larus argentatus) chick

Method of Storage until Inoculated
Held alive for 11 days; frozen at -70dC for 22 days

Footnotes

Section III - Method of Isolation

Inoculation Date
9/2/1972

Animal (Details will be in Section 6)
nb mice

Route Inoculated
Intracerebral

Reisolation
Yes

Other Reasons

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)
pH 3.0 titer 2.7 dex , pH 7.2 titer 3.0 dex

Lipid Solvent (ether - % used to test)
1:2

After Treatment Titer
<0.5 dex

Control Titer
2.7 dex

Lipid Solvent (chloroform)
1:2

After Treatment Titer
<0.5 dex

Control Titer
2.7 dex

Lipid Solvent (deoxycholate)
1:1000, 1:500, 1:100

After Treatment Titer
<0.5, <0.5, <1.5 dex

Control Titer
2.9 dex

Other (formalin, radiation)

Virion Morphology

Shape

Dimensions
<220nm

Mean
nm

Range
nm

Measurement Method
Filtration (3)

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)
No	**SMB ext. by sucrose-acetone**	**Goose**
pH Range **5.8-7.4**	pH Optimum	
Temperature Range **4dC, 22dC, 37dC**	Temperature Optimum	

Remarks

Serologic Methods Recommended
CF, NT, IFA

Footnotes

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

Avalon (CanAr 173)

Virus (Strain)	Antigen/Virus CF Ht/Ho	Antigen/Virus CF Ratio	Antigen/Virus NT Ht/Ho	Ascitic Fluid CF Ht/Ho	Ascitic Fluid CF Ratio	Ascitic Fluid NT Ht/Ho
Paramushir (LEIV 2268c) [4]	256/512	1/2	2.0/3.0	64/64	1/1	3.0/2.0
Avalon (CanAr 15)	256/128	2/1	2.2/3.3	64/128	1/2	3.3/>2.5
Avalon (CanAr 46B)	512/256	2/1	2.3/>2.9	64/128	1/2	3.0/>2.5
Avalon (CanAn 476)	512/>512	<1/1	>2.5/>2.5	128/128	1/1	>2.5/>2.5
Sakhalin (LEIV 71c)	<4/16	<1/4	0.5/0.4	<4/128	<1/32	0.2/>2.5
Tillamook (RML 86)	<4/128	<1/32	2.2/2.2	<4/128	<1/32	0.8/>2.5
Taggert (MI-14850)	<4/512	<1/128	2.4/>4.3	<4/128	<1/32	0.6/>2.5
Clo Mor (ScotAr 7)	<4/16	<1/4	1.8/0.4	<4/128	<1/32	0.2/>2.5

NT: HI given in dex

NT: LNI given in dex

Ascitic Fluids	Antigens: Avalon CanAr 173	Avalon CanAr 15	Avalon CanAr 46B	Avalon CanAn 476	Tillammok RML 86	Clo Mor ScotAr7
Avalon (CanAr173)	128/128 *	64/128	64/128	128/128	0	0
Avalon (CanAr15)	256/>512	128/>512	128/512	128/512	4/32	4/4
Avalon (CanAr46B)	512/>512	512/256	256/256	512/256	0	0
Avalon (CanAn476)	512/>512	512/>512	512/>512	512/>512	8/128	0
Tillamook (RML 86)	0	0	0	4/4	128/256	32/32
Clo Mor (ScotAr7)	0	0	0	0	8/128	16/16
Group Sakhalin **	16/128	16/128	16/64	16/64	128/256	128/16

* Serum titer/antigen titer

** Prepared from mice immunized against Sakhalin 194541 (LEIV 71c), Tillamook 37297 (RML 86), Taggert (AusMI-14850) and Clo Mor (ScotAr 7) viruses.

Section VI - Biologic Characteristics

Virus Source (all VERTEBRATE isolates)
Blood (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)
Chicken, duck, and human embryo fibroblasts(PC)	PMR, P-5		No CPE	3.5-5.5 [a]				+ (3)
L (CL)			CPE	2.5 (3)				
A1 (CL)			CPE	4.5 (3)				
HeLa (CL)			CPE	6.0 (3)				
RH, Vero (CL)			No CPE					- (3)

[a] 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
Ixodes (Ceratixodes)			Great Island, Newfoundland, Canada ;1971-72(1,2)
uriae White (= Ixodes putus)			
eggs	0/3/227 *		
larvae	0/6/48 *		
nymphs	1/60/479 *		
adult males	1/14/105 *		
adult females	1/60/356 *		
Larus argentatus (chicks)	1/84	2/23 NT	
Larus marinus (chicks)	0/2	0/1 NT	
Rissa tridactyla (chicks)	0/15		
Uria aalge (chicks)	0/3		
Fratercula arctica (chicks)	0/20		
Fratercula arctica (ad)		18/29 NT	
Oceanodroma leucorhoa (ad)		12/63 NT	
Ixodes signatus	1/130/7,244 *		Paramushir Island, Sakhalinsk, USSR (3)
Ixodes uriae	3/335/8,302 *		Tyuleniy Island, Sakhalinsk Region, USSR (3)
Ixodes uriae	1/400/20,270		Bering Island, Kamchatsk Region, USSR (3)
Ixodes uriae	1		Cape Sizun seabird reserve, Brittany France (5)

* Number of isolates/number of pools/number of specimens

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)	CanAr 173, P-2-9	ic 0.02	Paralysis, death	8-14	4.6-6.1
Mice (nb)	P-4, 9	ip	Occasional death	11-14	6.7
Mice (nb)	P-9	sc	None; no viremia detected		
Mice (wn)	P-4, 9	ic	Occasional death	8-13	5.1
Mice (wn)		ip	CF and NT antibody; no viremia		
Mice (wn)		sc	CF and NT antibody; no viremia		
chicks (1 day)	P-9	ic	No viremia or NT antibody		
chicks (1 day)		sc	No viremia or NT antibody		
	PMR, P-5				
hamsters (ad)		ip	No illness (3)		
guinea pigs (ad)		ip	No illness (3)		
rats (ad)		ip	No illness (3)		
rats (nb)		ic	No illness (3)		

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
Aedes aegypti (1)		4.5(P-9)	2-14	28			Negative		Suckling Mice
Culex pipiens quinquefasciatus		4.5(P-9)	2-14	28			Negative		Suckling Mice
Anopheles quadrimaculatus		4.5(P-9)	2-10	28			Negative		Suckling mice

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)
Newfoundland, Canada (1,2); Paramushir Island, Tyuleniy Island, and Bering Island, USSR (3,4), France (5)

Suspected (Antibody only detected)

Section XIII - References

1. Main, A.J., et al. 1976. J. Med. Ent. 13:309-315.
2. Main, A.J., et al. 1976. J. Wildlife Dis. 12:182-194.
3. Lvov, D.K., et al. 1976. Arch. Virol. 51:157-161.
4. Lvov, D.K., et al. 1981. Vop. Virusol. No. 2. 148-152.
5. Quillien, M.C., et al. 1986. Acta Virol. 30:418-427.

Remarks

Paramushir virus was recently demonstrated to be serologically identical to Avalon virus by complement-fixation, neutralization, and fluorescent-antibody techniques (4). Paramushir was isolated from Ixodes uriae and I. signatus in the eastern USSR (3,4).