| Virus Name: Avalon | | Abbreviation: AVAV |
|---|---|---|
| Status<br>**Possible Arbovirus** | Select Agent<br>**No** | SALS Level<br>**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)<br>**1:2** | After Treatment Titer<br>**<0.5 dex** | Control Titer<br>**2.7 dex** |
| Lipid Solvent (chloroform)<br>**1:2** | After Treatment Titer<br>**<0.5 dex** | Control Titer<br>**2.7 dex** |
| Lipid Solvent (deoxycholate)<br>**1:1000, 1:500, 1:100** | After Treatment Titer<br>**<0.5, <0.5, <1.5 dex** | Control Titer<br>**2.9 dex** |

Other (formalin, radiation)

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**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<br>**5.8-7.4** | pH Optimum | |
| Temperature Range<br>**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).**