

Virus Name: Uukuniemi	Abbreviation: UUKV	
Status <b>Probable Arbovirus</b>	Select Agent No	SALS Level 2
SALS Basis <b>Results of SALS surveys and information from the Catalogue.</b>		
Other Information		
Antigenic Group <b>Uukuniemi</b>		

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

Prototype Strain Number / Designation <b>S 23</b>	Accession Number	Original Date Submitted 10/17/1984
Family <b>Bunyaviridae</b>	Genus <b>Uukuvirus</b>	
Information From <b>N. Oker-Blom and P. Saikku</b>	Address <b>Department of Virology, University of Helsinki, Finland SF 00290</b>	
Information Footnote <b>Reviewed by editor</b>		

#### Section II - Original Source

Isolated By (name) <b>N. Oker-Blom, et al. (1)</b>	Isolated at Institute <b>Helsinki, Finland</b>	
Host Genus <b>Ixodes ricinus (L.) (pool of 182 engorged specimens)</b>	Species	Host Age/Stage <b>Adult</b>
Sex <b>Female</b>		
<u>Isolated From</u> <u>Isolation Details</u>		
Signs and Symptoms of Illness	Arthropod <b>Engorged</b>	
Time Held Alive before Inoculation <b>22 days</b>		
Collection Method <b>Picked off from cows</b>	Collection Date <b>6/26/1950</b>	
Place Collected (Minimum of City, State, Country) <b>Uukuniemi, SE Finland</b>		
Latitude <b>61° 48' N</b>	Longitude <b>30° 3' E</b>	
Macrohabitat <b>Deciduous forest-pasture</b>	Microhabitat <b>On cows</b>	Method of Storage until Inoculated <b>Alive at 22dC</b>
Footnotes		

### **Section III - Method of Isolation**

Inoculation Date  
7/18/1960

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

Route Inoculated  
**Intracerebral**

**Other Reasons**  
**Repeated isolations from the same area.**

## Homologous Antibody Formation by Source Animal

### Test(s) Used

## Footnotes

## Section IV - Virus Properties

## Physicochemical RNA, Single Strand

Percentage wt. of Virion Protein      Lipid      Carbohydrate

Virion Polypeptides: Number  
3 Details  
Nucleocapsid (N): 25,000 MW; glycoproteins (G1, G2): 75,000, 65,000 MW (4, 33, 34).

### Non-virion Polypeptides: Number      Details

**Virion Density**  
**1.20 gm/cc in CsCl**

Nucleocapsid Density  
1.31 gm/cc in CsCl (4)

## **Stability of Infectivity (effects)**

### pH (infective range)

Rel. stable at pH 4.6-11.4 (mouse brain suspension)(8)

Lipid Solvent (ether - % used to test)      After Treatment Titer      Control Titer  
**1:5**      **1.7 dex**      **5.6 dex**

Lipid Solvent (chloroform) After Treatment Titer Control Titer

Lipid Solvent (deoxycholate) After Treatment Titer Control Titer  
**1:1000** **1.0 dex** **5.5 dex**

**Other (formalin, radiation)**  
**Not stabilized by MgCl<sub>2</sub>; sens. to chloroform, nonionic and ionic detergents (4,8,9)**

## **Virion Morphology**

Shape Dimensions  
95 nm

Mean nm Range nm

Measurement Method Surface Projections/Envelope

### Nucleocapsid Dimensions, Symmetry

**Morphogenesis**

Site of Constituent Formation in Cell	Site of Virion Assembly <b>Buds through smooth surface cytoplasmic membranes (3)</b>	Site of Virion Accumulation <b>Cisternae and vesicles of Golgi complex and endoplasmic reticulum</b>
Inclusion Bodies	Other	

**Hemagglutination**

Hemagglutination	Antigen Source	Erythrocytes (species used)
Yes	SMB ext. by sucrose-acetone; BHK-21 culture fluid-serum free	Goose
pH Range	pH Optimum	
5.6-6.6	5.6-5.8	
Temperature Range	Temperature Optimum	
4dC, RT, 3dC		
Remarks		
<b>HA not readily produced from all strains</b>		
Serologic Methods Recommended		
CF, HI, NT		
Footnotes		
<b>HA not readily produced from all strains</b>		

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

Neutralizing indices in suckling mice [1]:

Immune serum	Virus strain		
	S 23	AK 9	Tribec
Uukuniemi (S 23)	2.0 *	0.1	0.0
Tick-borne encephalitis (TBE)	<0.6	1.9	ND
AK 9 (local strain of TBE)	0.4	>2.7	ND
Tribec	<0.9	ND	>1.8
Lymphocytic choriomeningitis	0.0	ND	ND

\* LNI in dex.

In Yale Arbovirus Research Unit the Uukuniemi virus was found to be related to some recent isolates (mainly from ticks) which together form the Uukuniemi group.

Results of complement-fixation tests (J. Casals):

Antigen	Immune serum			
	S 23	Potepli	GA	MWA
Uukuniemi S 23	256/128	512/128	8/8	0
Uukuniemi, Potepli	128/256	512/256	8/8	0
Grand Arbaud	16/16	16/16+	256/256	Traces
Manawa	0	0	8/8	512/512

Serum titer/antigen titer; 0 = no fixation at dilutions 1:8.

Results of hemagglutination-inhibition test (J. Casals):

Serum	Antigen, 8 Units					
	UUK	GA	MWA	LJN	BHA	QRF
Uukuniemi	640	40	40	0	0	0
Grand Arbaud	160	160	40	0	0	0
Manawa	80	20	160	0	0	0
Lanjan	0	0	0	80	0	0
Bhanja	0	0	0	0	80	0
Silverwater	0	0	0	0	0	0
Quaranfil	0	0	0	0	0	80
Johnston Atoll	0	0	0	0	0	320

0 = <10

(Ponteves and Zaliv Terpeniya are Uukuniemi group viruses listed in this catalogue not appearing in these tables.)

## 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				
		Day (c)	Extent (d)	Titer TCD50/ml (e)	Day (c)	Size (f)	Titer PFU/ml (e)		
BHK-21 (CL)	TC, SMB	7	CPE	7.0**					
BHK-21 (CL)					4	Plaques	8.5**		
BS-C-1 (CL)	SMB	14	CPE	7.0					
Chick embryo (PC)	TC, SMB	5	CPE	2.0					
Chick embryo( PC)					4	Plaques	7.5		
Chick embryo( PC)		5		7.0 (a)					
PK (CL)		5	CPE	6.6					
LLC-MK2(CL)						Plaques			
Vero(CL), marten(CL), dormouse kidney(CL)			Partial to no CPE					+	

\*\* Expressed in dex

(a) Interference assay

See references 3, 9, 26, 27

## 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		0/191 NT	Kumlinge, SW-Finland (11)
Man		6/100 HI	Czechoslovakia (12)
Man		19/127 HI	Hungary (13)
Cow		0/727 NT	N. Finland (11)
Cow		371/1,809 NT	S., Middle-Finland (11)
Cow		95/100 NT	Uukuniemi, Finland(11)
Cow		84/92 NT	Kumlinge, Finland (11)
Apodemus flavicollis	1	11/288 CF	Czechoslovakia (14, 15)
Apodemus flavicollis	1		Poland (16)
Passerine birds in summer (10 species)	12/736	5/23 HI	SW-, SE-Finland(9, 17) Czechoslovakia (18)
Blackbird, <i>Turdus merula</i>	1		USSR (10)
<i>Ixodes ricinus</i>	12/12,001		SE-, SW-Finland (9)
<i>Ixodes ricinus</i>	39/30,872		Czechoslovakia (19, 20)
<i>Ixodes ricinus</i>	2/3,811		Poland (16)
<i>Ixodes ricinus</i>	3/4,204		USSR (21)
<i>I. ricinus</i>	2		Norway (32)
<i>I. ricinus</i> and <i>I. persulcatus</i>	17		Lithuania (30)
<i>I. Uriae</i>	1*		Norway (32)

\* Uukuniemi-like

## 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 3	ic 0.01	Paralysis, death (9,22-24)	6	7.8	
Mice (nb)		ip 0.03	Paralysis, death (9,22-24)	12	2.6	
Mice (nb)		sc				
Mice (wn)		ic 0.03	No symptoms (9,22-24)			
Mice (wn)		ip 0.1	Antibody production (9,22-24)			
Apodemus flavicollis		ic, sc	No viremia; isolations from organs (14)			
Microtus arvalis (nb)		ic	Death (14)	5-8	7.0	
Chlethrionomys glareolus (ad)		ic	No viremia; isolations from organs (14)			
guinea pig (2 mo)			Antibody formation			
chicken (6 day)		sc	Viremia, antibody formation (9)		3.6	
embryonated egg (6-11 day)		CAM, ys	Death, CAM inflamm.(22)	3-6	7.5 (yolk)	
rhesus monkey		ic	Viremia, meningeal symptoms (25)			
rhesus monkey		ip	Viremia		7.0	

**Section IX - Experimental Arthropod Infection and Transmission**

Arthropod species & virus source(a)	Method of Infection log10/ml (b)		Incubation period (c)		Transmission by bite (d)		Assay of arthropod, log10/ml (e)		
	Feeding	Injected	Days	°C	Host	Ratio	Whole	Organ	System
Ixodes ricinus	Passes transtadially (28); experimental transovarial transmission demonstrated (35).								
Aedes aegypti	Multiplication, transmission (5)								

**Section X - Histopathology**

Character of lesions (specify host)

Meningoencephalitis, myelitis (14,23) and myositis (24) in suckling rodents; lymphocytic meningitis in rhesus monkeys when inoculated ic (25).

Inclusion Bodies

Intranuclear

Organs/Tissues Affected

Category of tropism

Neurotropic

**Section XI - Human Disease**

In Nature	Residual	Death
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Subclinical	Overt Disease
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Clinical Manifestations

Number of Cases	Category (i.e. febrile illness, etc.)
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**Section XII - Geographic Distribution**

Known (Virus detected)

Finland (1), Czechoslovakia (19), Poland (16), USSR (10,21,29), Lithuania (30), Norway (32).

Suspected (Antibody only detected)

### Section XIII - References

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#### Remarks

First strains were isolated in Finland from ticks collected in June 1959 (Uukuniemi I 1 and Jomala A 21) (1,9). In many experiments Czech. strains (prototype Potepli PO 63) (19) and the Russian geographical variant "Shumakh" (10) have been used.