

Virus Name: Kemerovo		Abbreviation: KEMV
Status Probable Arbovirus	Select Agent No	SALS Level 2
SALS Basis Results of SALS surveys and information from the Catalogue.		
Other Information		
Antigenic Group Kemerovo		

SECTION I - Full Virus Name and Prototype Number

Prototype Strain Number / Designation R 10	Accession Number	Original Date Submitted 7/25/1984
Family Reoviridae	Genus Orbivirus	
Information From Dr. H. Libikova	Address Institute of Virology, Slovak Ac. Sci., 80939 Bratislava, Czechoslovakia	
Information Footnote Revised		

Section II - Original Source

Isolated By (name) Chumakov and Libikova, et al. (1)	Isolated at Institute Romanovka near Kemerovo, Siberia, USSR	
Host Genus Ixodes persulcatus	Species	Host Age/Stage Imago
Sex Female		
<u>Isolated From</u>	<u>Isolation Details</u>	
Signs and Symptoms of Illness	Arthropod Depleted	
Time Held Alive before Inoculation One day		
Collection Method Woolen flag	Collection Date 5/21/1962	
Place Collected (Minimum of City, State, Country) Kemerovo region, near Kemerovo, USSR		
Latitude 50° 40' N	Longitude 80° 40' E	
Macrohabitat West Siberian secondary taiga	Microhabitat	Method of Storage until Inoculated 4dC
Footnotes		

Section III - Method of Isolation

Inoculation Date
5/23/1962

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

Route Inoculated Intracerebral	Reisolation Not tried
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Other Reasons
No similar viruses were present in the laboratory

Homologous Antibody Formation by Source Animal

Test(s) Used

Footnotes

Section IV - Virus Properties

Physicochemical
RNA, Double Strand

Pieces (number of genome segments) 10	Infectivity No	Sedimentation Coefficients(s) 12-14(S)
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Percentage wt. of Virion Protein about 80%	Lipid None	Carbohydrate None
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Virion Polypeptides: Number	Details
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Non-virion Polypeptides: Number	Details
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Virion Density	Sedimentation Coefficients(s) (S)
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Nucleocapsid Density	Sedimentation Coefficients(s) (S)
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Stability of Infectivity (effects)

pH (infective range)
Stable at pH 6-9, inactivated at pH 3-5 (4)

Lipid Solvent (ether - % used to test) 20%	After Treatment Titer 4.9 dex	Control Titer 7.2 dex
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Lipid Solvent (chloroform) 5%	After Treatment Titer 1.0 dex	Control Titer 6.2 dex
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Lipid Solvent (deoxycholate) 0.1%	After Treatment Titer 1.0 dex	Control Titer 4.5 dex
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Other (formalin, radiation)
Inactivated by 1 M MgCl₂ at 50C for 1 hour (4); trypsin, papain, 6-azauridine (14,16)

Virion Morphology

Shape Spherical	Dimensions 70 nm
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Mean nm	Range nm
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Measurement Method Electron microscopy	Surface Projections/Envelope None	Nucleocapsid Dimensions, Symmetry
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Morphogenesis

Site of Constituent Formation in Cell Cytoplasm	Site of Virion Assembly Area of endoplasmic reticulum (19)	Site of Virion Accumulation
Inclusion Bodies	Other	

Hemagglutination

Hemagglutination No	Antigen Source SMB ext. by sucrose-acetone	Erythrocytes (species used) Goose
pH Range 5.75-7.2	pH Optimum	
Temperature Range +4dC- +20dC	Temperature Optimum	

Remarks

Other sources for antigen prod.: infant rat brain, CE cell cult. fluid; all were neg. (3).

Serologic Methods Recommended

CF, NT (5,17,18) and fluorescent antibody test (23)

Footnotes

Other sources for antigen prod.: infant rat brain, CE cell cult. fluid; all were neg. (3).

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

No relationship: [3] TBE, JBE, SLE, WEE, EEE, Sindbis, Colorado tick fever, Newcastle disease, pseudorabies, LCM, Tahyna, hog cholera virus.

Dr. J. Casals (personal communication) has tested by complement-fixation, a series of mouse immune sera with homologous titers from 64 to 512, against KEM antigen, with no reaction at dilution 1:4. The sera which thus failed to react with KEM antigen were: polyvalent groups A and B, California encephalitis, Calovo, Chenuda, Colorado tick fever, Eretmapodites 147, Guaroa, Hughes, Ilesha, Bhanja, Ganjam, Kairi, LCM, Manzanilla, GD 1, mouse hepatoencephalitis, Nyamanini, Oropouche, Quaranfil, Silverwater, Simbu, Tacaiuma, Tacaribe, Thogoto, Turlock, Uukuniemi, Wad Medani and Wyeomyia.

Definitive relationship to:

1. Orbiviruses Lipovnik, Koliba and Tribec isolated in 1963 in Czechoslovakia [6] - [8] .
2. Chenuda, Mono Lake, Huacho; less to Wad Medani [15] , [17] .
3. By cross-CF and plaque NT, 4 Siberian tick isolates and one human isolate were separated from 10 Czechoslovak tick isolates (Koliba, Tribec, Lipovnik strains). The difference is quantitative. one Siberian strain (KM 3) and one Czechoslovak strain (Tribec orig.) have a broader antigenic structure [17] , [18] .
4. Two apparently new serotypes (Tindholmor, Mykines) isolated from *I. uriae* ticks collected from Common Puffin in the Faeroe Islands, Denmark [24] . Other related serotypes from *I. uriae*: Bauline, Cape Wrath, Great Island, Yaquina Head; and from other tick species: Baku, Okhotskiy, Seletar, Sixgun City.

Virus Source (all VERTEBRATE isolates)

Lab Methods of Virus Recovery (ALL ISOLATIONS)
Newborn mice

Cell system (a)	Virus passage history (b)	Evidence of Infection						Growth Without CPE +/- (g)
		CPE			PLAQUES			
		Day (c)	Extent (d)	Titer TCD50/ml (e)	Day (c)	Size (f)	Titer PFU/ml (e)	
Chick embryo (PC)	CEC 14 or CEC 4, emb. egg 7	1-3	4+	7-8*	3-4	1-5 mm	7-8*(4,19)	
Human amnion (PC)		2-3	4+	5.5				
Human fibroblasts (PC)		2-3	4+	5.5				
BHK-21 (CL)		1-3	4+	8.5(18)				
L cells (CL)		2-3	4+	5.0(4)				
HeLa (CL)		2-3	4+	4.5				
Detroit-6, KB, HEp-2(CL)		2-3	4+	3.6-3.9				
Vero (CL)		2-3	4+	7.5-8.5	4-5	1-4 mm	7-8.5(18)	
Ae. albopictus (CL)		1-4	+ -	4.5		No plaques	+ (28)	

* Expressed in dex.

Vertebrate (species and organ) and arthropod	No. isolations/No. tested	No. with antibody/No. tested Test used	Country and region
Man (CSF)	2/23	4/142 NT	Kemerovo region, USSR (3)
Ixodes persulcatus	16/1,035 (93 pools)		Kemerovo region, USSR (3,9)
Hyalomma anatolicum	1		Uzbek SSR, USSR (29)
Phoenicurus phoenicurus(blood)	1/441		Egypt, 1961 (18)
Horses		16/16 NT	Kemerovo region, USSR (3,10)
Cattle		67/151 NT	
Small mammals *		25/94 NT	
Birds **		32/87 NT	

* Most important species: *Clethrionomys rutilus* 16/35, *C. glareolus* 4/17.

** Most important: *Turdus pilaris* 22/24, *T. ruficollis* 2/6.

Experimental host and age	Passage history and strain	Inoculation Route-Dose	Evidence of infection	AST (days)	Titer log ₁₀ /ml
Mice (nb)	CEC 3,	ic 0.01	Fatal encephalitis	2-3	8.0
Mice (nb)	emb. egg 5,	ip 0.05	Viremia		
Mice (nb)	SMB 1-3	sc 0.05	Viremia (13)		
Mice (wn)		ic 0.03	Discrete encephalitis		
Mice (wn)		ip 0.1	Formation of antibodies		
rats, hamsters(nb)		ic 0.03	Fatal encephalitis	2-3	8.0
rats, hamsters(ad)		ic 0.05	No deaths		
guinea pigs, rabbits (subadult)		ic 0.05	No deaths		
Rhesus monkey (yg)	L75(human isolate)	intrathalamic	Meningitis, no death (20)		
embryonated		al.c.			
eggs (7-8 day)	R 10, KM 3	or ys	Death in 2-3 days (3,19)		5.0-7.0

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, females half engorged;		Inoc.into body cavity	2	RT					1000-fold multiplication(10)
Chick embryo suspension		3-5 d							Persistence for at least 20 days

Section X - Histopathology

Character of lesions (specify host)
lc, nb mice: Acute necrotizing encephalitis without marked inflammatory lesions (3,11). Small necroses of epidermis and corium, with inflammatory lesions. Rhesus: Lymphocytic meningitis. Macrophage, plasmocyte infiltration (20).

Inclusion Bodies Intranuclear
Lower Vertabrates

Organs/Tissues Affected
Brain (LV); skin, intestines, lungs, metanephron (LV) (11,19)

Category of tropism
Neurotropic; possible dermatropism

Section XI - Human Disease

In Nature Reported	Residual	Death
Subclinical Reported	Overt Disease Reported	

Clinical Manifestations
Fever (R), headache (R), stiff neck (R), meningitis. Involved in the pathogenesis of overt tick-borne encephalitis as concurrent infection (27).

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

Known (Virus detected)
USSR, Egypt (3,22)

Suspected (Antibody only detected)

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23. Karmysheva, V.Ya, et al. 1972. *Vop. Virusol.* 17:397-401.
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28. Libikova, H. and Buckley, S.M. 1971. *Acta Virol.* 15:393-403.
29. Chumakov, M.P. et al. 1977-78. Unpublished data

Remarks