Virus Name: Belgrade		Abbreviation: BGDV
Status **Probably not Arbovirus**	Select Agent **No**	SALS Level
SALS Basis		
Other Information		
Antigenic Group **Hantaan**		

SECTION I - Full Virus Name and Prototype Number

Prototype Strain Number / Designation	Accession Number	Original Date Submitted
Belgrade 1		11/26/1991
Family **Hantavirus**	Genus	
Information From **Ana Gligic**	Address **Institute of Immunology and Virology, Vojvode Stepe 458 11000 Belgrade, Yugoslavia Laboratory of Central Nervous System Studies, NIH, Bethesda, MD,**	
Information Footnote		

Section II - Original Source

Isolated By (name)	Isolated at Institute	
Ana Gligic	**Institute of Immunology and Virology, Belgrade**	
Host Genus **Patient with severe hemmorhagic fever with renal syndrome**	Species	Host Age/Stage **21 years**
Sex **Male**		

Isolated From	Isolation Details
Clot	

Signs and Symptoms of Illness	Arthropod
Fever, pulmonary hemmorhage, renal failure	
Time Held Alive before Inoculation	
Collection Method	Collection Date
Place Collected (Minimum of City, State, Country) **Pig farm near Belgrade Yugoslavia**	
Latitude	Longitude
Macrohabitat	Microhabitat
Footnotes	

Section III - Method of Isolation

Inoculation Date
7/12/1990

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

Route Inoculated

Reisolation
Yes

Other Reasons

Homologous Antibody Formation by Source Animal
Yes

Test(s) Used
NT, IFA, IgM, ELISA

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)

Lipid Solvent (ether - % used to test)	After Treatment Titer	Control Titer
Lipid Solvent (chloroform)	After Treatment Titer	Control Titer
Lipid Solvent (deoxycholate)	After Treatment Titer	Control Titer

Other (formalin, radiation)

Virion Morphology

Shape	Dimensions	
Mean nm	Range nm	
Measurement Method	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)
pH Range	pH Optimum	
Temperature Range	Temperature Optimum	

Remarks

Serologic Methods Recommended
Immunoflourescence, immunoenzyme plaque assay

Footnotes

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

PRNT antibody titers of rat immune sera to:

Viruses	Nantaan	Seoul	Puumala	Prospect Hill	Belgrade
Nantaan	1024	<32	<32	<32	<32
Seoul	<32	1024	<32	ND	<32
Puumala	<32	<32	1024	<32	<32
Prospect Hill	<32	<32	<32	512	<32
Belgrade	<32	<32	<32	<32	2048

PRNT: Plaque-reduction neutralization test

Titers are expressed as the reciprocal of the highest serum dilution producing 80% reduction in the number of virus plaques, as enumerated by neutral red or immunoperoxidase staining.
Polymerase chain reaction. Using Hantaan virus M segment-specific (HanG2-I, 5' -TGGGCTGCAAGTGCATCAGAG -3'; HanG2-2, 5'-ACTGCTGTACAGCCTGTGCC-3') and Hantavirus genus-specific M segment (HG2F1, 5'-TGGGCTGCAAGTGC-3' ; hg2r1, 5'-CAACCCCAGCTAGTTTCA-3') oligonucleotide promer pairs, we were able to enzymatically amplify the 411-bp and 365-bp hantavirus sequence, respectively, in RNA extracted from Belgrade virus- infected Vero E6 calls. Restriction analysis if the enzymatically amplified, 411-bp product of Belgrade virus indicated that it is genetically distinct from Hantaan virus and from all known hantaviruses.

Section VI - Biologic Characteristics

Virus Source (all VERTEBRATE isolates)
Blood (M), urine (M)

Lab Methods of Virus Recovery (ALL ISOLATIONS)
Vero E6 cells

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 E6		6		None	10	1-1.5 mm		5 *

* 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
Human (blood)	1		Belgrade, Yugoslavia
Human (blood, urine)	1		South Serbia, Yugoslavia, Central Serbia, Yugoslavia
Human (blood)		Positive	Bulgaria, Greece, Albania, Hungary, Czechoslovakia

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)	Belgrade 1 (P6)	100 PFU ic	Fatal meningoencephalitis	12-16	7.0
mice (nb)	Belgrade 2 (PG)	100 PFU ic	Fatal meningoencephalitis	12-16	7.0
mice (nb)	Belgrade 3 (PG)	30000 PFU ic	Fatal meningoencephalitis	12-16	
mice (wn)		ic			
mice (wn)		ip			

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

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
Fever Hemmorhagic manifestations, shock, ranal failure/insufficiency (hematuria, proteinuria), meningeal signs, pulmonary edema/bleeding

Number of Cases
135 cases in Yugoslavia in 1989

Category (i.e. febrile illness, etc.)

Section XII - Geographic Distribution

Known (Virus detected)
Yugoslavia

Suspected (Antibody only detected)
Bulgaria, Greece, Albania, Czechoslovakia

Section XIII - References

1. Gligic, A. 1991. European Journal of Epidemiology. (Submitted)
2. Gligic, A. 1991. Journal of Infectious Diseases. (Submitted)

Remarks