Virus Name: Sandfly fever Naples	Abbreviation: SFNV

Status
Arbovirus

Select Agent
No

SALS Level
2

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

Other Information

Antigenic Group
Phlebotomus Fever

SECTION I - Full Virus Name and Prototype Number

Prototype Strain Number / Designation
Sabin

Accession Number

Original Date Submitted
7/11/1984

Family
Bunyaviridae

Genus
Phlebovirus

Information From
Robert B. Tesh

Address
Yale Arbovirus Research Unit

Information Footnote
Revised

Section II - Original Source

Isolated By (name)
A.B. Sabin (1)

Isolated at Institute
Children's Hosp. Res. Fdn., Cincinnati

Host Genus
Man

Species

Host Age/Stage
Adult

Sex
Male

Isolated From	Isolation Details
Serum/Plasma	

Signs and Symptoms of Illness
Febrile illness compatible with Sandfly fever (1)

Arthropod

Time Held Alive before Inoculation

Collection Method

Collection Date
7/13/1944

Place Collected (Minimum of City, State, Country)
Naples, Italy

Latitude
40° 50' N

Longitude
14° 12' E

Macrohabitat
Outbreak of febrile illness among occupying American troops in World War II (1)

Microhabitat

Method of Storage until Inoculated
On dry ice (lyophilized serum)

Footnotes

Section III - Method of Isolation

Inoculation Date
12/18/1944

Animal (Details will be in Section 6)
Man

Route Inoculated

Reisolation
Not tried

Other Reasons

Homologous Antibody Formation by Source Animal
Not tested

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)

Lipid Solvent (ether - % used to test)	After Treatment Titer	Control Titer
Lipid Solvent (chloroform) **20%**	After Treatment Titer **1.0 dex**	Control Titer **5.9 dex (2)**
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)
Yes	**SMB ext. by sucrose-acetone + sonication**	**Various (3)**
pH Range	pH Optimum	
6.0-6.8	**6.0 (3)**	
Temperature Range	Temperature Optimum	
	Not dependent	

Remarks
Trypsin treatment of erythrocytes enhances agglutination (3)

Serologic Methods Recommended
CF, NT, HI

Footnotes
Trypsin treatment of erythrocytes enhances agglutination (3)

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

HI tests [4] :

Antigen (4 units)	HI titer of antibody to:									
	SFN	ICO	CHG	ANH	BUJ	ITP	SFS	KAR	CDU	AMT
Naples	1280	160	80	40	20	20	0	80	0	20
Icoaraci	80	640	20	20	40	0	0	160	0	80
Chagres	320	80	>320	160	40	0	0	80	0	160
Anhanga	40	20	40	2560	160	0	0	40	0	40
Bujaru	20	40	20	80	80	0	0	20	0	40
Itaporanga	10	160	80	10	80	320	0	40	0	80
Sicilian	0	10	10	0	80	0	80	20	0	10
Karimabad	20	80	0	0	40	0	0	>320	0	20
Candiru	0	40	0	10	0	10	0	80	160	0
Arumowot	20	40	20	0	20	0	0	20	0	160

Naples : SFN, Chagres: CHG, Bujaru: BUJ, Sicilian: SFS, Candiru: CDU Icoaraci: ICO, Anhanga: ANH, Itaporanga: ITP, Karimabad: KAR, Arumowot: AMT

CF tests [6] :

Antibody	Antigen		
	Naples	TOS	TEH
Naples	256/128 *	128/256	128/64
TOS	64/64	256/>256	64/64
TEH	128/128	128/256	256/128

* Highest antibody titer/highest antigen titer

In cross-CF tests, Naples antigen and antibody failed to react with the following antigens and immune reagents: FRI, CAI, NIQ, AGU, CAC, BUE, PT, CHG, ICO, CDU, ITP, URU, PAC, ANH, BUJ, AMT, SFS, GF, KAR, SAL, and CHV [5] .
In cross-plaque neutralization tests, SFN virus and immune serum did not neutralize FRI, CAI, NIQ, AGU, CHL, CAC, BUE, PT, CHG, ICO, CDU, ITP, URU, PAC, ANH, BUJ, AMT, SFS, GF, KAM, SAL, SAF, RVF, ALE, and ITA viruses and immune sera [5] , [7] .
Naples antiserum (homologous titer = 2560) neutralized Gordil virus at 1:20 dilution [7] .

Section VI - Biologic Characteristics

Virus Source (all VERTEBRATE isolates)
Blood (M)

Lab Methods of Virus Recovery (ALL ISOLATIONS)
Newborn mice. Human volunteers used in original isolation of virus

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 (CL)	Man 3, SM 48	5-6	4+		7	1-2 mm	5.2** (6)		
LLC-MK2 (CL)	Man 3, SM 53				10	1 mm	4.8 (8)		
Mouse kidney (PC)	SM 18	3	3-4+	5.5**(9)					
Human kidney (PC)					23	Plaques	3.5 (9)		
Hamster kidney (PC)	SM 58		No CPE		8	2-3 mm	6.7 (10)		
BHK-21 (CL)	SM 53	2-4	2-3+	7.3(11)					

SFN virus did not multiply in Aedes aegypti or Aedes albopictus cells (19).

** 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
Man	1		Naples, Italy (1)
Man	2/2,824		Nile Delta, Egypt (12)
Man	2/47		Pakistan (13, 14)
Man	4/12		Aurangabad, India (15)
Man	1		USSR (21)
Phlebotomus papatasi (females)	4/241,530		Egypt (16, 17)
Phlebotomus papatasi	1/4		Iran (13, 14)
Phlebotomus spp.	11/26,734		India (15)

Antibodies to SFN virus have been reported in human populations from a variety of localities in southern Europe, Northern Africa and Central Asia (7).

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)	Prototype	ic 0.01	Death (18)	8	7.8
Mice (nb)	Man 3, SM 5	ip			
Mice (nb)		sc			
Mice (wn)		ic	No illness (18)		
Mice (wn)		ip			
Mice (nb)	Man 3, SM 48	ic	Death (6)	5	7.0
hamster(nb)		ic	Death (6)	4-5	6.8

* The original Naples strain was isolated from human serum after a single blind passage (ic) in newborn mice. Initially it produced encephalitis after 14 days; but by the fifth ic passage, the incubation period had decreased to 8 days. By the 35th ic passage, it was lethal ic to weanling mice although the incubation period was longer (18).

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
SFN virus did not multiply or survive in Aedes albopictus or Culex quinquefasciatus after inoculation (20).									

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
Significant

Subclinical — Overt Disease

Clinical Manifestations
Fever, headache, retroorbital pain, conunctival injection, myalgia and weakness (1)

Number of Cases
Hundreds to thousands (7)

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

Section XII - Geographic Distribution

Known (Virus detected)
Italy, Egypt, India, Iran, Pakistan, USSR (7)

Suspected (Antibody only detected)
Mediterrean Littoral, Middle East and Central Asia (7)

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Remarks