| Virus Name: Simian hemorrhagic fever | Abbreviation: SHFV |
|---|---|

Status
**Not Arbovirus**

Select Agent
**No**

SALS Level
**2**

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

Other Information

Antigenic Group
**Ungrouped**

## SECTION I - Full Virus Name and Prototype Number

Prototype Strain Number / Designation
**VR42-0/M6941 (1,3)**

Accession Number

Original Date Submitted
11/17/1984

Family
**Flavivirdae**

Genus
**Not listed**

Information From
**Dr. Nicola M. Tauraso**

Address
**Biologics Standards, National Institutes of Health, Bethesda, MD 20014 USA**

Information Footnote
**Reviewed by editor**

## Section II - Original Source

Isolated By (name)
**Dr. Nicola M. Tauraso**

Isolated at Institute
**Division of Biologics Standards, NIH**

Host Genus
**Rhesus (Macaca mulatta) monkey, no sentinel**

Species

Host Age/Stage
**Juvenile**

Sex
**Not Answered**

| Isolated From | Isolation Details |
|---|---|
| **Serum/Plasma** | |

Signs and Symptoms of Illness
**Rapid onset, early fever, mild facial edema, anorexia, adipsia, dehydration, [proteinuria, cyanosis, skin [petechiae, melena, epistaxis [and shock.**

Arthropod

Time Held Alive before Inoculation

Collection Method
**Terminal bleeding**

Collection Date
**1/29/1966**

Place Collected (Minimum of City, State, Country)
**Bethesda, Maryland**

Latitude

Longitude

Macrohabitat

Microhabitat
**Indoors**

Method of Storage until Inoculated
**Serum frozen at -70dC**

Footnotes

## Section III - Method of Isolation

Inoculation Date
**5/20/1966**

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

Route Inoculated

Reisolation
**Yes**

Other Reasons
**Other surviving animals developed CF, IFA and neut antibodies**

Homologous Antibody Formation by Source Animal
**Not tested**

Test(s) Used
**original animal died**

Footnotes

## Section IV - Virus Properties

Physicochemical
**RNA**

| | | |
|---|---|---|
| Pieces (number of genome segments) | 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)
**3.0 labile; rel. heat (50C) stable; divalent cations enhanced inact. at 50C**

| | | |
|---|---|---|
| Lipid Solvent (ether - % used to test) | After Treatment Titer | Control Titer |
| Lipid Solvent (chloroform)<br>**1:20** | After Treatment Titer<br>**<1.0 dex** | Control Titer<br>**4.8 dex** |
| Lipid Solvent (deoxycholate) | After Treatment Titer | Control Titer |

Other (formalin, radiation)

**Virion Morphology**

| | | |
|---|---|---|
| Shape<br>**Spherical** | Dimensions<br>**40-45 nm** | |
| Mean<br>nm | Range<br>nm | |
| Measurement Method<br>**Electron microscopy (4)** | Surface Projections/Envelope<br>**Envelope observed (4);** | Nucleocapsid Dimensions, Symmetry |

**Virus core = 20-25 nm**

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**Morphogenesis**

| Site of Constituent Formation in Cell | Site of Virion Assembly | Site of Virion Accumulation |
|---|---|---|
| Inclusion Bodies | Other | |

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**Hemagglutination**

| Hemaggiutination | Antigen Source | Erythrocytes (species used) |
|---|---|---|
| **No** | **Infected cell cultures; extracted infected spleen and brain (5)** | **Goose** |

| pH Range | pH Optimum |
|---|---|
| ***6.8-7.4** | |

| Temperature Range | Temperature Optimum |
|---|---|
| **4dC, 24dC, and 37dC** | |

Remarks
*** Other erythrocytes tested included rhesus and African green monkeys, hamster, mouse, rat, guinea pig, human (type O) and day-old chick.**

Serologic Methods Recommended
**CF, IFA and NT**

Footnotes
*** Other erythrocytes tested included rhesus and African green monkeys, hamster, mouse, rat, guinea pig, human (type O) and day-old chick.**

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

No relationship found to other viruses by CF and IFA tests (see Ref. [6] , [7] ).

In one-way tests using 20X concentrated cell culture SHF antigen for CF tests or SHF virus-infected coverslips for fluorescent-antibody (FA) tests, with antisera against the following viruses, negative results were obtained [6] .

| | | |
|---|---|---|
| Adenoviruses: | SV-11, SV-15, SV-17, SV-20, SV-25, SV-27, SV-36, ICH. | |
| Arboviruses: | Group A: | Bebaru, EEE, WEE, Una, Uruma (Mayaro) |
| | Group B: | Bussuquara, dengue 1, 2, 3, 4, Ilheus, MVE, Powassan, SLE, WN |
| | Bunyamwera group: | Batai, bunyamwera, Cache Valley, Germiston, Guaroa, Ilesha, Kairi, Sororoca, Tensaw, Calovo, Wyeomyia |
| | California group: | CE, Melao, Tahyna |
| | Miscellaneous: | Anopheles A, Changuinola, Chagres, EHD, Icoaraci, Kemerovo, Naples SF, Tacaribe, Junin, Tribec, VS-Indiana, VS-NJ, Cocal |
| Herpesviruses: | H. simplex, canine herpes, simian cytomegalic, B virus | |
| Myxoviruses: | Parainfluenza 1, 2, 3, SV-5; avian leukosis (RSV/RIF and RSV-Harris); SV-41, measles, mumps, respiratory syncitial, rubella, NDV, rabies | |
| Papovavirus: | SV-40, K virus | |
| Picornavirus: | ECHO 1, 2, 3, 5, 6, 7, 8, 9, 11, 12, 14; SV-2, SV-16, SV-19, Theiler's GD VII; poliovirus 1, 2, 3 | |
| Reovirus: | Reo 1, 2, 3, SV-12, SV-59 | |
| Miscellaneous: | SV-4, SV-28, Sv-31, SA-1; PVM, LCM, Crimmean HF, Korean HF, Himalaya HF; hamster HF, human gamma globulin (1:10) | |

Positive results were obtained only with sera from simian hemorrhagic fever outbreaks: Sukhumi/64, Bethesda/64, Davis/67, and Sussex/68.
SHF not related to Marburg virus [7] .

## Section VI - Biologic Characteristics

Virus Source (all VERTEBRATE isolates)
**Blood (LV)**

Lab Methods of Virus Recovery (ALL ISOLATIONS)
**USU-104, embryonic rhesus kidney cell culture.**

| 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) | |
| USU-104 (CL) | M/2, MA-104/8 | 6-7 | CPE | 5.0* (3) | | | | | |

* 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 |
|---|---|---|---|
| Erythrocebus patas (monocytes) (Chronically infected, continuously viremic) | 1 * | | NIH, Bethesda, MD, USA (13) |

Rhesus (Macaca mulatta) monkeys Virus isolated only from clinically affected animals recently imported from New Delhi, India (1). Other species listed below have developed disease after contact with recently imported sick rhesus monkeys. Many virus isolations made of the Bethesda/64 agent (8).

Other monkey species affected: M. nemestrina (9,10); M. speciosa (1-3); M. assamensus (9,10); M. irus (1-3,11) with a disease similar to that seen in M. mulatta.

* Isolate differs antigenically and biologically from prototype SHF virus (13)

## 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) | | ic | None | | |
| Mice (nb) | | ip | None | | |
| Mice (nb) | | sc | | | |
| Mice (wn) | | ic | None | | |
| Mice (wn) | | ip | None | | |
| rhesus (M. mulatta) (juvenile) | M/2, MA-104/8 | sc 1 | Anorexia, hemorrhagic diatheses, eventually shock and death | 5-14 | 7-8 |

Unable to infect the following hosts: Suckling and young adult Syrian hamster, Hartley guinea pig, white mouse, Sprague-Dawley rat, and cat; and embryonated chicken egg.

## 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)
**Lesions of SHF in rhesus monkey include capillary and venous hemorrhages in the intestine, lung, nasal mucosa, dermis, spleen, perirenal and lumbar subperitoneum, adrenal and liver. Two striking lesions occur in the duodenum and spleen (2).**

Inclusion Bodies — Intranuclear

Organs/Tissues Affected
**Lungs (LV), liver (LV), spleen (LV), blood vessels (LV)**

Category of tropism

## Section XI - Human Disease

| In Nature | Residual | Death |
|---|---|---|
| Subclinical | Overt Disease | |

Clinical Manifestations
**Human disease not observed**

Number of Cases — Category (i.e. febrile illness, etc.)

## Section XII - Geographic Distribution

Known (Virus detected)
**From recently imported rhesus (Macaca mulatta) monkeys**

Suspected (Antibody only detected)

## Section XIII - References


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## Remarks

**At present there is no evidence to suggest that arthropods play a role in the transmission of SHF (6).**