| Virus Name: Rift Valley fever | Abbreviation: RVFV |
|---|---|

Status
**Arbovirus**

Select Agent
**Yes**

SALS Level
**3**

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

Other Information
**USDA Permit Required, DOC Permit Required, Hepa Filtration, USDA Restricted, USDA High Consequence Agent, Vaccination Recommended**

Antigenic Group
**Phlebotomus Fever**

## SECTION I - Full Virus Name and Prototype Number

Prototype Strain Number / Designation

Accession Number

Original Date Submitted
2/3/1985

Family
**Bunyaviridae**

Genus
**Phlebovirus**

Information From
**M.P. Weinbren**

Address
**Puerto Rico Nuclear Center, Caparra Heights Station, San Juan,P.R.**

Information Footnote
**Reviewed by editor**

## Section II - Original Source

Isolated By (name)
**Daubney, et al. (1)**

Isolated at Institute
**Vet. Res. Lab., Kabete, Kenya**

Host Genus
**Sheep**

Species

Host Age/Stage
**Lamb (newborn)**

Sex
**Not Answered**

| Isolated From | Isolation Details |
|---|---|
| **Whole Blood** | |

Signs and Symptoms of Illness
**Abortion and death in sheep, especially high mortality in young lambs.***

Arthropod

Time Held Alive before Inoculation

Collection Method
**Not stated**

Collection Date
**7/27/1930**

Place Collected (Minimum of City, State, Country)
**North of Lake Naivasha, Kenya**

Latitude
**0° 44' S**

Longitude
**36° 26' E**

Macrohabitat
**Upland tropical savannah**

Microhabitat
**Daylight, ground level, outdoors**

Method of Storage until Inoculated
**Not stated**

Footnotes

## Section III - Method of Isolation

Inoculation Date
**7/28/1930**

Animal (Details will be in Section 6)
**Sheep**

Route Inoculated
**Intravenous**

Reisolation
**Yes**

Other Reasons
**Other isolations of identical virus in same outbreak**

Homologous Antibody Formation by Source Animal

Test(s) Used

Footnotes

## Section IV - Virus Properties

Physicochemical
**RNA**

| | | |
|---|---|---|
| Pieces (number of genome segments)<br>**3 (22)** | Infectivity | Sedimentation Coefficients<br>(s)<br>(S) |
| Percentage wt, of Virion Protein | Lipid | Carbohydrate |
| Virion Polypeptides: Number<br>**3** | Details | |
| Non-virion Polypeptides: Number | Details | |
| Virion Density | Sedimentation Coefficients(s)<br>(S) | |
| Nucleocapsid Density | Sedimentation Coefficients(s)<br>(S) | |

### Stability of Infectivity (effects)

pH (infective range)

| | | |
|---|---|---|
| Lipid Solvent (ether - % used to test) | After Treatment Titer<br>**<2.0 dex** | Control Titer<br>**4.0 dex (9)** |
| Lipid Solvent (chloroform) | After Treatment Titer | Control Titer |
| Lipid Solvent (deoxycholate) | After Treatment Titer<br>**2.0 dex less (6)** | Control Titer |

Other (formalin, radiation)
**Inact. by 0.25% formalin, 4C/3 days; by methylene blue+light (15).**

### Virion Morphology

| | | |
|---|---|---|
| Shape | Dimensions<br>**94-100 nm (20-22)** | |
| Mean<br>nm | Range<br>nm | |
| Measurement Method | Surface Projections/Envelope | Nucleocapsid Dimensions, |

| | | |
|---|---|---|
| **Electron microscopy (22)** | **Envelope observed (22)** | Symmetry |

**Morphogenesis**

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

**Hemagglutination**

| | | |
|---|---|---|
| Hemaggiutination<br>**Yes** | Antigen Source<br>**Mouse serum, acetone-ether; freezing 72 hours (7); sucrose-acetone (8)** | Erythrocytes (species used)<br>**Goose** |
| pH Range<br>**Varies** | pH Optimum | |
| Temperature Range<br>**4-37dC** | Temperature Optimum<br>**25dC** | |

Remarks
**Frozen serum of naturally infected animal has been successfully used as antigen in HI test for diagnosis (11). * Short illness, loss of appetite, listlessness, asthenia.**

Serologic Methods Recommended
**HI, CF, NT**

Footnotes
**Frozen serum of naturally infected animal has been successfully used as antigen in HI test for diagnosis (11). * Short illness, loss of appetite, listlessness, asthenia.**

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

RVF virus antigenically related to viruses of the PHL serogroup by HI and plaque-reduction neutralization tests [23] .

Zinga virus has been shown to be identical to RVF virus by IFA and NT [30] , [31] .

## Section VI - Biologic Characteristics

Virus Source (all VERTEBRATE isolates)
**Blood (M) (LV), liver (LV), spleen (LV), milk (LV), urine (LV), feces (LV)**

Lab Methods of Virus Recovery (ALL ISOLATIONS)
**Newborn and weanling mice, baby chick, chick embryo, hamster, primates**

| 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) | |

Rift Valley fever virus grows readily in virtually all types of cell culture.

## 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 (many isolations from veterinarians and lab workers infected while handling animals, tissues or virus). | 1 | (Naturally infected case) | South Africa (10) |
| Man | | 146/2,223 CF | Nigeria (26) |
| Man | 7 | | Uganda (19) |
| Lambs, sheep, cattle | Many | | South Africa (1, 3, 4, 10, 11) |
| Man (serum) | 10 | | Egypt (24) |
| Man (serum) | 53 | | Egypt (25) |
| Wild rodents | | 0/106 NT | Uganda (19) |
| Mosquitoes of various species-numerous isolations, likely vectors: | | | |
| Eretmapodites chrysogaster group(2) Aedes (Ochlerotatus) caballus(4) Aedes (Neomelaniconion) circumluteolus(5) Culex (Culex) theileri(11) | | | |
| Culicoides spp. | 1 | | Nigeria (32) |
| Micropteropus pusillus (bat) | 1 | | Guinea (34) |
| Hipposideros abae (bat) | 1 | | Guinea (34) |

Primary hosts probably are sheep, cattle, buffalo, certain antelopes and rodents (1,3,4,10,11) all infected by mosquitoes; and man - most commonly infected while handlinng sick or dead animals, but sometimes by mosquitoes. Epizootics have caused enormous economic losses. Culex (Culex) theileri probably main epizootic vector (33).

## 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) | Uganda | ic 0.03 | Death | 1-4 | 9.0 |
| Mice (nb) | | ip 0.03 | Death | 2-6 | 8.0 |
| Mice (nb) | | sc | | | |
| Mice (wn) | | ic 0.03 | Death | 2-5 | 8.0 |
| Mice (wn) | | ip 0.06 | Death | 1-7 | 6.6 |
| rhesus monkey (ad) | | sc | Mild febrile or asymptomatic infection with resulting antibody response | | |
| Cercopithecus aethiops (ad) | | sc | Same as rhesus | | |
| newborn merino lambs | | sc | Death | 1-2 | |
| Pregnant ewes | | sc | Abortion, fever, sometimes death | | |
| Field voles, dormice, wood mice | | | Susceptible (12) | | |
| kittens, puppies | | sc | Death (18) | | |
| 5 African buffalo (Syncerus caffer) | | | 1/2 pregnant aborted; 4/5 48 hr viremic (29) | | |

## 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 |
| Virus has been transmitted experimentally by the bite of Erchrysogaster(13), Ae caballus (4), Ae aegypti (8). The first two of these and other mosquitoes are probably natural vectors. | | | | | | | | | |
| Culex pipiens: | Laboratory reared mosquitoes from Nile Delta epizootic area transmitted RVF virus following feeding on viremic hamsters. Infection rata = 87%; trans. rate = 40% (28). | | | | | | | | |

## Section X - Histopathology

Character of lesions (specify host)
**Lambs,mice: generalized hepatic necrosis with intranuclear acidophilic histpath inclusions. Nuclear chromatin retains basophilia - distinguishing them from yellow fever. Hyaline acidophilic bodies in cytoplams in RVF - while in YF the whole cell is acidophilic and there are no cytoplasmic bodies.**

Inclusion Bodies
Intranuclear
**Lower Vertabrates**

Organs/Tissues Affected
**Brain (LV)*, liver (LV).**

Category of tropism
*** Sheep, goats, hepatotropic.Mice convert to neurotropic on serial ic inoculation**

## Section XI - Human Disease

In Nature
**Significant**

Residual
**Significant**

Death
**Reported**

Subclinical
**Significant**

Overt Disease
**Significant**

Clinical Manifestations
**Fever, headache, prostration, conjunctival inflammation, stiff nect, myalgia, arthralgia, CNS signs (including encephalitis, hemorrhagic signs, lymphadenopathy, vomiting, central scotoma- detached retina (1,16,17).**

Number of Cases
**300 cases in detail; numerous others reported (8).**

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

## Section XII - Geographic Distribution

Known (Virus detected)
**Kenya, Uganda, South Africa (1,2,3,4,5,11), Egypt (24,25)**

Suspected (Antibody only detected)
**Sudan, Nigeria (26)**

## Section XIII - References


1. DAUBNEY, R., et al. 1931. Jour. Path. and Bact. 34:545-579.
2. SMITHBURN, K.C., et al. 1948.Brit. J. Exp. Path. 29:107-121.
3. ALEXANDER, R.A. 1951. J. S. Afr. Vet. Med. Assn. 22:105.
4. GEAR, J., et al. 1955. S. Afr. Med. J. 29:514.
5. KOKERNOT, R.H., et al. 1957. S. Afr. J. Med. Sci. 22:71-80.
6. THEILER, M. 1957. Proc. Soc. Exp. Biol. and Med. 96:380- 382.
7. MIMS, C.A.C. and MASON, P.J. 1956. Brit. J. Exp. Path. 37:423-433.
8. WEINBREN, M.P. Doctoral Thesis, Witwatersrand Univ. Medical School.
9. ANDREWES, C.H. and HORSTMAN, D. 1949. J. Gen. Microbiol. 3:290-297.
10. GEAR, J., et al. 1951. S. Afr. Med. J. 25:908-912.
11. SMITHBURN, K.C.Unpublished results.
12. FINDLAY, G.M. 1931. Trans. Roy. Soc. Trop. Med. and Hyg. 25:229.
13. SMITHBURN, K.C., et al. 1949. Brit. J. Exp. Path. 30:35-47.
14. KOKERNOT, R.H., et al. 1956. J. Immunol. 77:313-323.
15. MACKENZIE, R.D. 1935. J. Path. and Bact. 40:65.
16. SCHRIRE, L. 1951. S.Afr. Med. J. 25:926.
17. FREED, I. 1951. S. Afr. Med. J. 25:930.
18. MITTEN, J.G., et al. 1970. J. Infect. Dis. 121:25-31.
19. HENDERSON, B.E., et al. 1972. Ann. Trop. Med. Parasit. 66:343-355.
20. Lecastas, G. and WEISS, K.W. 1968. Arch. ges. Virusforsch. 25:58-64.
21. POLSON, A. and STANDARD L. 1970. Virology 40:781-791.
22. MURPHY, F.A. 1973. Intervirology 1:297-316.
23. SHOPE, R.E., et al. 1980. Lancet. Vol. 1 886-888.
24. ABDEL-WAHAB, K.S.E.D., et al. 1978. Trans. Roy. Soc. Trop. Med.Hyg. 72:392-396.
25. IMAM, I.Z.E. 1979. Bull. Wld. Hlth. Org. 57:100%-439.
26. TOMORI, O. 1980. J. Med. Virol. 5:343-350.
27. RICE, R.M., et al. 1980. Virology 105:256-260.
28. MEEGAN, J.M., et al. 1980. Am. J. Trop. Med. Hyg. 29:1405-1410.
29. DAVIES, P.G. and KARSTAD, L. 1981. Trop. Anim. Hlth Prod. 13:185-188.
30. SHOPE, R.E. Personal communication. 1982.
31. MEEGAN, J.M. 1983. Lancet i: 641.
32. FABIYI, A. 1980. Zbl. Bakt. Suppl 9:215-218.
33. MCINTOSH, B.M. 1975. Unpublished.
34. BOIRO, I., et al. 1987. Bull. Soc. Path. Ex. 80:62-67.


## Remarks

**Many infections in veterinary field officers and laboratory workers - often with prolonged convalescence; eye complications common in man; herdsmen often become infected. Neuro-adapted virus used with success in South African Veterinary Service as a living virus vaccine. Dead virus vaccine recently prepared in U.S. evokes antibody response.**