| Virus Name: Usutu | Abbreviation: USUV |
|---|---|

Status
**Possible Arbovirus**

Select Agent
**No**

SALS Level
**2**

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

Other Information

Antigenic Group
**B**

## SECTION I - Full Virus Name and Prototype Number

Prototype Strain Number / Designation
**SAAr 1776**

Accession Number

Original Date Submitted
3/2/1984

Family
**Flaviviridae**

Genus
**Flavivirus**

Information From
**B.M. McIntosh**

Address
**National Institute for Virology, P/Bag X4, Sandringham, 2131, South Africa**

Information Footnote
**Revised**

## Section II - Original Source

Isolated By (name)
**B.M. McIntosh**

Isolated at Institute
**S.Afr.Inst. for Med. Res.,Johannesburg**

Host Genus
**Culex neavei**

Species

Host Age/Stage
**Adult**

Sex
**Female**

Isolated From

Isolation Details

Signs and Symptoms of Illness

Arthropod

Time Held Alive before Inoculation
**A few hours**

Collection Method
**By hand off vegetation**

Collection Date
**1/30/1959**

Place Collected (Minimum of City, State, Country)
**Ndumu, Natal, South Africa**

Latitude
**27° 0' S**

Longitude
**32° 0' E**

Macrohabitat
**Tropical, coastal lowland, savannah woodland**

Microhabitat

Method of Storage until Inoculated
**Solid CO2**

Footnotes

## Section III - Method of Isolation

Inoculation Date
**2/6/1959**

Animal (Details will be in Section 6)
**nb mice**

Route Inoculated
**Intracerebral**

Reisolation
**No**

Other Reasons
**A virus antigenicallyunique to the laboratory**

Homologous Antibody Formation by Source Animal

Test(s) Used

Footnotes

## Section IV - Virus Properties

Physicochemical

| | | |
|---|---|---|
| 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)

| | | |
|---|---|---|
| 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<br>**Yes** | Antigen Source<br>**SMB ext. by sucrose-acetone** | Erythrocytes (species used)<br>**Goose** |
| pH Range<br>**6.3-6.6** | pH Optimum<br>**6.4** | |
| Temperature Range | Temperature Optimum | |

Remarks

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

Footnotes

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

| Antigens or HIAF | USU Antigen CF (1) | USU HIAF CF (1) |
|---|---|---|
| Bagaza | 8 | 8 |
| Ntaya | 32 | 16 |
| West Nile | 8 | 2 |
| Koutango | 8 | 8 |
| Banzi | >256 | 16 |
| Uganda S | 64 | 64 |
| Bouboui | 64 | 16 |
| Saboya | >128 | 32 |
| Spondweni | >1024 | 16 |
| Zika | 32 | 64 |
| Wesselsbron | 32 | 32 |
| Dengue 1 | 64 | 32 |

| | | |
|---|---|---|
| Yellow fever | >128 | 64 |
| Dakar bat | >64 | 64 |

CF: results expressed as quotient of homologous/heterologous titers

In cross PRNT with 42 flaviviruses, USU virus reacted only with 4 viruses as follows [2] :

| Viruses orAntisera | USU Virus PRNT | USU Antibody PRNT |
|---|---|---|
| Japanese Enc. | 320/160 | 40/<20 |
| Murray Valley Enc. | 80/80 | 40/320 |
| West Nile | 1280/80 | 40/40 |
| Alfuy | 40/<20 | 40/80 |

PRNT: results = homologous/heterologous titers

USU virus is a member of the West Nile serological subgroup [2] , [3] .

## Section VI - Biologic Characteristics

Virus Source (all VERTEBRATE isolates)

Lab Methods of Virus Recovery (ALL ISOLATIONS)
**BHK-21 cell cultures**

| 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) | MB 7 | | | | 2 | 10 mm | 8.* (4) | | |
| LLC-MK2 (CL) | | | | | 7 | 2 mm | 7.5 (4) | | |
| PS (CL) | MB 8 | | | | 3-4 | 4 mm | 8.0 (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 |
|---|---|---|---|
| Man | | 0/198 NT | S. Africa; Mozambique (1) |
| Cattle and sheep | | 1/262 NT | S. Africa (1) |
| Praomys spp. (rodent) | 1 | | Central African Republic (6) |
| Birds: | | | |
| Bycanistes sharpei | 2 | | |
| Andropadus virens | 1 | | |
| Turdus libonyanus | 1 | | Nigeria (7) |
| Culex neavei | 1 | | Natal, S. Africa (1) |
| Coquillettidia aurites | 1 | | Uganda (8) |
| Culex spp. | 1 | | Lunyo Forest, Uganda (9) |
| Culex perfuscus | 1 | | Senegal (10, 6) |
| 4 mosquito species | 4 | | Cameroun (6) |
| 6 mosquito species | 6 | | Central African Republic (6) |
| Man (serum) | 1 | | Central African Republic (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) | Ar 1776 | ic 0.03 | Death | 5-6 | |
| Mice (nb) | | ip | | | |
| Mice (nb) | | sc | | | |
| Mice (wn) | | ic 0.03 | Death | 6-7 | 8.4 |
| Mice (wn) | | ip | | | |
| guinea pig (ad) | | ic 0.2 | Antibody | | |
| Arvicanthis abyssinicus | Strain unk. | ip 7.2 dex | Trace of viremia, days 1-2; NT antibody prod. (11) | | |

## 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 |
| Culex neavei | 6.0 | | 14 | 26 | hamster | 14 mosq. failed to transmit | 2/10 mosquitoes were infected on 14th day | | |

## 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 |
|---|---|---|
| **Reported** | | |

Subclinical — Overt Disease

Clinical Manifestations

| Number of Cases | Category (i.e. febrile illness, etc.) |
|---|---|
| **1** | **Febrile illness with rash** |

## Section XII - Geographic Distribution

Known (Virus detected)
**South Africa (1), Uganda (8,9), Nigeria (7), Central African Republic (6, 13) Senegal (10),Cameroun (6)**

Suspected (Antibody only detected)

## Section XIII - References


1. McIntosh, B.M. Unpublished.
2. De Madrid, A.T. and Porterfield, J.S. 1974. J. Gen. Virol. 23:91-96.
3. Porterfield, J.S. In: The Togaviruses. Schlesinger, R.W. editor. Academic Press. 1980. p. 22.
4. Stim, T.B. 1969. J. Gen. Virol. 5:329-338.
5. De Madrid, A.T. and Porterfield, J.S. 1969. Bull. World Health Organ. 40:113-121.
6. Rapport Annuel de l'Institut Pasteur de Dakar. 1980.
7. Director, YARU. Personal communication. 1972.
8. Williams, M.C., et al. 1964. Ann. Trop. Med. Parasitol. 58:367-374.
9. Henderson, B.E., et al. 1972. Ann. Trop. Med. Parasitol. 66:343-355.
10. Cornet, M., et al. 1979. Cah. ORSTOM. Ent. Med. Parasitol. 17:149-164.
11. Simpson, D.I.H. and Lule, M. 1964. E. Afr. Virus Res. Inst. Report. No. 14. p. 48.
12. Jupp, P.G. 1971. J. Ent. Soc. S. Africa 34:339-357.
13. Rapport Annuel Du Centre Collaborateur OMS De Reference Et De Recherche Pour Les Arboviruses. Institut Pasteur, Dakar. 1983.


## Remarks

**Since the original registration of USU virus, the taxon of the arthropod source of AR 1776 was altered from Culex univittatus to Culex neavei as a result of taxonomic revision (12). Isolations reported from Cameroun and Central African Republic are apparently a serologic variant, S-t Y 276 (6).**